

**CORNELL UNIVERSITY ANNOUNCEMENTS**  
**GRADUATE SCHOOL 1960-1962**

## CORNELL UNIVERSITY ANNOUNCEMENTS

These publications are designed to give prospective students and others information about Cornell University. The prospective student should have a copy of *General Information*; after consulting that, he may wish to write for one or more of the following Announcements:

*New York State College of Agriculture (Four-Year Course), New York State College of Agriculture (Two-Year Course), College of Architecture, College of Arts and Sciences, School of Education, College of Engineering, Department of Far Eastern Studies, New York State College of Home Economics, School of Hotel Administration, Independent Divisions and Departments (Extramural Courses; Unclassified Students; Military, Naval, and Air Science; Physical Education; Clinical and Preventive Medicine), New York State School of Industrial and Labor Relations, Summer School.*

Undergraduate preparation in a recognized college or university is required for admission to the following Cornell divisions, for which Announcements are available: *Graduate School of Business and Public Administration, Law School, Medical College, Cornell University-New York Hospital School of Nursing, Graduate School of Nutrition, New York State Veterinary College, Graduate School.*

*Requests for these publications may be addressed to*

CORNELL UNIVERSITY ANNOUNCEMENTS

EDMUND EZRA DAY HALL, ITHACA, NEW YORK

# GRADUATE SCHOOL

1960-1961 and 1961-1962

## CORNELL UNIVERSITY ANNOUNCEMENTS

Published by Cornell University at Edmund Ezra Day Hall, 18 East Avenue, Ithaca, New York, every two weeks throughout the calendar year. Volume 51. Number 7. September 24, 1959. Second-class mail privileges authorized at the post office at Ithaca, New York, December 14, 1916, under the act of August 24, 1912.

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# TENTATIVE CALENDAR

## FALL TERM

	1960-1961	1961-1962
Registration (new students, first day).....	Sept. 19-20	Sept. 18-19
Instruction begins at 1 p.m.....	Sept. 21	Sept. 20
Language examinations, French and German	Sept. 22	Sept. 21
Last day for filing statement-of-courses form and change-of-committee form and for new students to file candidacy forms.....	Oct. 1	Sept. 30
Last day for taking qualifying and language examinations other than French or German in order to have them considered as of the beginning of the term.....	Nov. 1	Nov. 1
Thanksgiving recess.		
Instruction ends at 12:50 p.m.	Nov. 23	Nov. 22
Instruction resumes at 8 a.m.	Nov. 28	Nov. 27
Last day for change-of-course registration....	Dec. 16	Dec. 15
Christmas recess.		
Instruction ends at 12:50 p.m.	Dec. 17	Dec. 23
Instruction resumes at 8 a.m.	Jan. 2	Jan. 8
Last day for completing all requirements for February degrees.....	Jan. 13	Jan. 12
Term ends.....	Feb. 1	Jan. 31

## SPRING TERM

Registration for students in residence.....	Jan. 23	Jan. 22
Registration for new and readmitted students.	Feb. 4	Feb. 3
Instruction begins at 8 a.m.....	Feb. 6	Feb. 5
Language examinations, French and German	Feb. 7	Feb. 6
Last day for filing statement-of-courses form and change-of-committee form and for new students to file candidacy forms.....	Feb. 18	Feb. 17
Last day for filing fellowship and scholarship applications for the following year.....	Feb. 10	Feb. 9

1960-1961 1961-1962

Last day for taking qualifying and language examinations other than French and German to have them considered as of the beginning of the term.....	Mar. 4	Mar. 3
Spring recess. Instruction ends at 12:50 p.m..	Mar. 25	Mar. 24
Instruction resumes at 8 a.m..	Apr. 3	Apr. 2
Last day for change-of-course registration....	Apr. 7	Apr. 6
Last day for completing all requirements for June degrees.....	May 26	May 25
Term ends.....	June 6	June 5
Commencement.....	June 12	June 11

## SUMMER

1960 1961 1962

Summer Research period begins.....	June 8	June 7	June 6
Registration for Summer School.....	June 27	June 26	June 25
Last day for filing statement-of-courses form and change-of-committee form and for new students to file candidacy forms.	July 1	June 30	June 29
Summer School ends.....	Aug. 6	Aug. 5	Aug. 4
Last day for completing all requirements for September degrees.....	Sept. 2	Sept. 1	Aug. 31
Summer Research period ends.....	Sept. 17	Sept. 16	Sept. 15

## ADMINISTRATION

DEANE W. MALOTT, A.B., M.B.A., LL.D., D.C.S., *President of the University*

THEODORE P. WRIGHT, B.S., D.Sc., *Vice President for Research*

JOHN W. McCONNELL, A.B., Ph.D., *Dean of the Graduate School*

JOHN E. DEIDRICK, B.S., M.D., *Associate Dean of the Graduate School of Medical Sciences*

CARROLL C. ARNOLD, B.A., M.A., Ph.D., *Secretary of the Graduate Faculty*

MAYFRED STIMMING, *Administrative Aide*

## GENERAL COMMITTEE

*Professor CHANDLER MORSE, at large, term expires 1959*

*Professor GEORGE H. HEALEY, at large, 1959*

*Professor ———, at large, 1961*

*Professor HAROLD A. SCHERAGA, at large, 1961*

*Professor STUART M. BROWN (Humanities), 1959*

*Professor WILLIAM G. MOULTON (Humanities), 1961*

*Professor OLAF F. LARSON (Social Sciences), 1959*

*Professor ROBERT H. FERGUSON (Social Sciences), 1961*

*Professor GRACE STEININGER (Biological Sciences), 1959*

*Professor NYLE C. BRADY (Biological Sciences), 1961*

*Professor GEORGE WINTER (Physical Sciences), 1959*

*Professor HENRY S. MCGAUGHAN (Physical Sciences), 1961*

THE SECRETARY OF THE FACULTY, *ex officio*

THE DEAN, *Chairman ex officio*

The office of the Graduate School is in Edmund Ezra Day Hall, Room 125. The office hours are 8:30 a.m. to 4:30 p.m. Monday through Friday and 8:30 a.m. to 12:15 p.m. on Saturday (except during the summer).

# THE GRADUATE SCHOOL

THE GRADUATE SCHOOL of Cornell University has jurisdiction over "all graduate work and any degree beyond the first degrees given by any college or school."\* It offers its students facilities for advanced study and research and assists them in obtaining a comprehensive view of a field of knowledge, together with the training required for independent investigation. It encourages them to associate freely with mature scholars who will give them the aid and direction they need. It expects to attain its end less through imposing an elaborate system of requirements than through developing a sense of responsibility for the advancement and wise application of knowledge.

The Graduate School recognizes a difference in administration and purpose between two types of advanced degrees: *General* and *Professional*.

## GENERAL DEGREES

### MASTER OF ARTS, MASTER OF SCIENCE, DOCTOR OF PHILOSOPHY

The Graduate School itself, and not a college or departmental group, administers and confers general degrees.† It imposes few requirements, permits great latitude to the individual in choice of studies, and expects each candidate to utilize all resources of the University relevant to his work. It emphasizes an essentially scientific training, a pursuit of truth as an end in itself rather than as a by-product of professional attainment.

The following sections relate less to the organization and routine upon which the Graduate School relies to secure these results‡ than to

\*On the recommendation of the Graduate faculty, the Board of Trustees has established the Graduate School of Medical Sciences in New York City. With the annual approval of the Graduate faculty, the faculty in New York City exercises complete jurisdiction over graduate instruction in that School, including programs leading to the degrees of Master of Science and Doctor of Philosophy. Because of the separate jurisdiction, this *Announcement* does not describe instruction in the Graduate School of Medical Sciences; inquirers interested in the instructional programs of that School should address the Associate Dean of the Graduate School, Cornell University Medical College, 1300 York Avenue, New York 21, N.Y., or write to that office for the *Announcement of the Graduate School of Medical Sciences*.

†For professional degrees, see p. 20.

‡These matters are described in detail in a *Code of Legislation*, copies of which may be obtained from the Graduate School Office by enrolled students and are available for consultation in academic and administrative offices of the University.



practical situations the student may encounter in beginning and carrying on his work.

## ADMISSION

To be admitted, an applicant (1) must hold a Bachelor's degree from a college or university of recognized standing, or must have done work equivalent to that required for such a degree; (2) must have had adequate preparation in the chosen field of instruction; and (3) as judged by his previous scholastic record or other achievements, must show promise of doing well in advance study and research. However, despite very good academic records, some applicants may be refused admission because of the limited staff and facilities in some fields. Hence, the Admissions Committee cannot give assurance that an application for the fall term received after February 1, or for the Summer Session after May 1, will receive the same consideration it might have been accorded at an earlier date.

Inquiries should be addressed to the Graduate School, 125 Edmund Ezra Day Hall, Cornell University, Ithaca, N.Y. The Office will furnish a form specifying what information and credentials are considered necessary. Since acceptance will be delayed until all such material has come in, recommendations and transcripts should follow the application as speedily as possible. *A fee of \$10.00 must accompany the application. Otherwise, the application will not be processed.*

Applicants in the following fields must include in their credentials the results of the Graduate Record Examination (Aptitude Test): Business and Public Administration, Economics (Aptitude and Advanced Tests), General Biology, Geology and Geography, History, Industrial and Labor Relations, Music, Speech and Drama, Psychology (Aptitude and Advanced), and Zoology. Although the examination is not required in other fields, the Admissions Committee welcomes submission of results and finds them helpful in acting upon the application. If for satisfactory reasons a person cannot take the examination before he wishes his application acted upon, the Admissions Committee may act provisionally, pending submission of scores at a later date. For information about the Graduate Record Examination, address the Educational Testing Service, 20 Nassau Street, Princeton, N.J.

Uncompleted files will be destroyed after one year; applications refused or temporarily withdrawn will be destroyed after three years unless the sender requests reconsideration.

## PROVISIONAL CANDIDATES

If for some reason applicants are not considered to be completely qualified for candidacy, they may be admitted as provisional candidates. Usually they may register for only one term in this status; but upon recommendation of their advisers and with the approval of the Grad-



uate School, they may reregister once. If later admitted to candidacy, they may petition for transfer of not more than one residence unit, provided they can submit convincing evidence that their work has been of the same quantity and quality as would have been required of candidates.

Since it is often difficult to evaluate the academic records of students from other countries, it is the policy of the Graduate School to admit most foreign students as provisional candidates.

#### **NONCANDIDATES**

When staff and facilities are available, the Graduate School will admit a few persons as noncandidates. They differ from the preceding class in that, though wishing additional advanced training, they do not intend to take another degree. As a rule, they may register as noncandidates for only two terms.

#### **VISITING FELLOWS**

Whenever possible, the faculty welcomes mature scholars who wish to use the facilities of the University to prosecute investigations or to work with the faculty in the advancement of knowledge. A scientist or scholar who wishes to work on the campus may, upon recommendation of the head of the department in which he wishes to work and endorsement of the college dean over that department, be given the title of Visiting Fellow by the President, providing he has no formal duties to perform and is paid no salary by the University. Visiting Fellows are exempt from tuition and University fees, but they will be expected to register with the Graduate School Office within two weeks after arrival. Research performed or courses attended as a Visiting Fellow are not credited toward advanced degrees, nor is any record kept of such work.

#### **CHANGE OF STATUS**

A student who wishes to change his status from provisional candidacy to regular candidacy or from one degree or field to another, or who, after receiving the Master's degree, wishes to undertake candidacy for the doctorate, must submit a request in writing to the Dean of the Graduate School, asking for transfer to the new status. He need not duplicate his original application or credentials, or submit further credentials unless the field concerned requires them, but reasons for the change in status should be given.

#### **DUPLICATION OF DEGREES**

The Graduate faculty receives occasional inquiries regarding candidacy for a second Master's or a second Doctor's degree, usually because the inquirer wishes to take major work in another field. Since the primary purpose of programs leading to advanced general degrees is acquirement of method and not acquirement of specific knowledge,

the Graduate faculty does not grant a second general degree at the same level. The holder of an advanced degree should consider applying as a noncandidate (see p. 11). In justifiable instances, the holder of an advanced professional degree may become a candidate for an advanced general degree, or vice versa.

## REGISTRATION

All graduate students in residence and using facilities of the University, whether or not they are taking courses, must register with the Graduate School and with the Registrar at the specified times, unless granted a leave of absence by the Dean of the Graduate School. Before the fall term, the Registrar notifies each student of an hour at which he is to report, and anyone who does not have notification at least a week before registration day should communicate with the Graduate School. For the spring term, the Registrar notifies only *readmitted* and *new* students; all others should claim registration permit cards at Barton Hall at a time announced in college offices and the *Cornell Daily Sun*.

When registering, the student should report to the table of the Graduate School, not to that of a college. He must register in person, not by proxy. If he cannot appear at the appointed hour, he must report to the Graduate School Office as soon as possible, bringing a written explanation endorsed by his adviser or Chairman. A fee of \$5 is required for late registration by matriculated students, not as a fine but as a payment of additional cost to the University for registering a student out of phase.

## MAJOR AND MINOR SUBJECTS

Candidates for the degrees of Master of Arts and Master of Science must offer one major and one minor subject; those for the doctorate, one major and two minor subjects. No variation in these numbers is allowed. The possible subjects are listed under the separate Fields of Instruction.

The standards of attainment for each subject are fixed by the member of the faculty who represents the subject on the Special Committee; he requires whatever in his judgment is necessary for proper training, including attendance in courses and seminars, as well as supervised or independent study. Since he will adjust the work to the candidate's preparation and interests, programs of persons registered in the same subject may differ greatly.

Within two weeks of first registration (one week for Summer School) and after consultation with members of the faculty, a candidate must notify the Graduate School of his selection of major and minor subjects. Thereafter, he may change subjects whenever a change appears feasible or beneficial.

Details of the change must be reported immediately to the Graduate School Office on the proper forms. However, the change can be completed only after the student has received assurance that faculty members representing the new subjects will undertake to direct his study in these subjects.

### SPECIAL COMMITTEES

Every candidate works under the direction of a Special Committee which he selects himself. Its members may be professors, associate professors, or assistant professors, or instructors who hold the Doctor's degree and who have as their primary work teaching and research on the Ithaca campus. Other persons holding professional appointments may also be eligible to serve as members of Special Committees provided their names appear on the Roster of the Graduate Faculty. A copy of the Roster may be consulted in the Graduate School Office. The Chairman is the representative of the major subject.

Faculty members who are on temporary appointment may serve as members of Special Committees but may not serve as Chairmen. The Chairman and the other members express their willingness to serve by signing the record of major and minor subjects, which the candidate files at the Graduate School. If a candidate wishes, he may invite *two* persons to represent a single major or minor subject.\*

If he finds it necessary to make subsequent changes in the membership of the Committee, he must secure the approval of all members of the newly constituted Special Committee and of the Dean.

The members of the Special Committee decide upon the candidate's program of study and research, whether he is making satisfactory progress, and whether he deserves the award of the degree. They conduct and report on all examinations required for the degree and approve and accept the thesis. The Committee and the candidate constitute an independent working unit, not subject to outside review unless the members request it.

*The candidate himself, however, must accept full responsibility for meeting the requirements of the Graduate School enumerated below.*

### RESIDENCE

The Graduate faculty regards study in residence as essential. For although a person working off campus may attain considerable proficiency in a technique or even in a narrow field of knowledge, he may fail in other ways to become such a representative as the School hopes to produce. He needs the acquaintance, company, aid, and stimulus of others engaged in work like his own; he should form the habit of

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\*One of these may be on the staff of the Agricultural Experiment Station at Geneva. For work at the Geneva Station, see pages 43, 44, 81, 85.

attending lectures and recitals and the meetings of groups in whose activities he takes interest. And he would be remarkably fortunate if he could gain more than a highly specialized knowledge of his subject without the libraries and laboratories of the University.

The faculty therefore requires that the record of each candidate for a Master's degree show two units of residence, that of each candidate for the doctorate six units. Special Committees will recommend a "unit" when in their opinion the student has satisfactorily completed an entire fall or spring term in residence and full-time study.

Instructors, assistants, and others employed in the University (including Experiment Stations) are eligible for residence units during the academic semester in accordance with the following formula:

- a. One residence unit a term if the appointment requires a total time, including preparation, consultation, transportation, etc., of not more than six clock hours a week.
- b. Three-quarters of a unit for not more than twenty clock hours.
- c. One-half of a unit for not more than thirty clock hours.
- d. If more than thirty clock hours, eligibility is to be determined by the General Committee on the analogy of regulations governing extramural study.

Candidates working off campus for more than twenty clock hours a week throughout a term cannot receive more than two-fifths of a unit of residence except on approval of the General Committee.

As a general rule, the Graduate School will not permit anyone to receive credit for more than two residence units in any period of twelve consecutive months.

#### **TRANSFER OF RESIDENCE**

Candidates for the Master's degree may not count study in other graduate schools as part of their residence, but are allowed to claim credit for two-fifths of a unit for previous work in the Cornell Summer Session. Candidates for the doctorate are usually permitted to count study elsewhere for the Master's degree as equivalent to two residence units; and those who have received training of an exceptional quality and amount may petition for more. But no commitment regarding this may be made until after the student has entered into residence and his Special Committee has had further opportunity to judge his accomplishments. The residence transferred cannot exceed that which would have been earned under similar circumstances at Cornell. Credits secured during study as an undergraduate or as a Special Student, even for work in courses designed primarily or wholly for graduate students, will not be allowed.

A candidate for the doctorate must complete two of the last four units in successive terms of study on the Cornell campus, earning at least one-half a residence unit each term.

### SUMMER RESEARCH

A candidate for an advanced degree who has been in residence at Cornell during two regular semesters may, on recommendation of his Special Committee and with the approval of the Dean, be permitted to register for an eight-week period of summer research at Cornell under the personal direction of a member of the Graduate faculty. In exceptional cases, registration for summer research may be allowed in the summer before the candidate's first year of residence. Upon successful completion of his research during this period, the candidate may receive one-half a unit of residence, providing he is free to devote his full time to his studies during this period. Candidates holding twenty-hour assistantship appointments may earn one-half a unit of residence by registering for twelve weeks of research. A maximum of two units may be earned in this way. The *Code of Legislation* should be consulted for further details.

### SUMMER SCHOOL

To receive two-fifths of a unit for work in the Summer School, the candidate must register in both the Summer School and the Graduate School and must file a statement of courses satisfactory to his Special Committee. Residence credit is not allowed for less than six credit hours or for unit courses, except where two three-week unit courses are taken successively and, thereby, considered the equivalent of the six-week Summer School. By arrangement with his Committee, a candidate may secure all of his residence for the Master's degree by attending Summer School. Normally, a candidate for the doctorate may earn no more than two units for work done in summers and extramurally. However, a third unit may be earned on approval of the General Committee.

### DIVISION OF EXTRAMURAL COURSES

Master's degree candidates whose employment within or outside the University restricts them to *less* than one-half a residence unit during a term may accumulate a maximum of one residence unit for work in the Division of Extramural Courses. Ph.D. candidates may accumulate two units, with a third permitted on approval of the General Committee. Instruction is offered in certain fields both on and off the campus. Fifteen credit hours are the equivalent of one residence unit, and six credit hours the equivalent of two-fifths of a residence unit, which is the smallest fraction that will be recorded by the Graduate School toward fulfillment of residence requirements. Detailed information concerning extramural courses and registration procedures may be obtained from the Division of Extramural Courses, Edmund Ezra Day Hall.



**CONTINUITY**

A candidate is expected to register each fall and spring term until he completes all requirements for the degree. If he finds this impossible, he must apply for a leave of absence or withdraw from the Graduate School. One who takes a leave of absence or fails to register for the next academic term will be held for a \$50 nonresident fee for each year he is on leave. Candidates who complete all degree requirements within one year of their leave of absence will be exempted from the \$50 fee. A candidate must complete all requirements for the degree within ten years of first registration.

A candidate who wishes readmission following a leave of absence should submit a written request to the Graduate School. If he has not registered during the preceding four years, he will be permitted to re-enroll only after the General Committee has stipulated what previous residence units he may retain.

**LANGUAGES**

Candidates required by fields or by the Graduate School to demonstrate ability in reading French or German must pass general written examinations administered by the Graduate Language Examination Board at Cornell University. These examinations are usually offered on the second day of classes during each session and will consist of translating a brief passage of representative prose in the student's general field. The use of a dictionary and similar aids will be permitted. The examiners will mark the performance "pass" or "fail."

Candidates who take examinations in languages other than French or German should arrange with the Graduate School Office for assignment to a suitable examiner and will be allowed one month from the beginning of the term to satisfy the requirement.

**INSTRUCTION IN FRENCH, GERMAN, AND RUSSIAN**

Courses designed to aid graduate students in reading French, German and Russian at a level of facility adequate for accurate research are given by the Division of Modern Languages in cooperation with the Graduate faculty. There are two term-courses—one at the elementary and one at the intermediate level—in each of the languages. Anyone registering for them is expected to attend regularly throughout the term, take all examinations, and complete assigned work. Pressure of other work, however severe or unexpected, will not be considered a sufficient excuse to justify cancellation or withdrawal in order to avoid a failing grade.

**ELEMENTARY FRENCH, GERMAN OR RUSSIAN 151.** Three hours—no credit. M W F (time to be announced).

**INTERMEDIATE FRENCH, GERMAN OR RUSSIAN 152.** Three hours—no credit. M W F (time to be announced).

**FOR THE MASTERS' DEGREES**

Each field of instruction states its requirements in its own section of this Announcement. If *college entrance language* is specified, the candidate's transcript of record must indicate that he has earned three college entrance units in one language, or two units in each of two languages, or the equivalent in college study. If *proficiency* is specified, the candidate must take and pass the examination described above. Any exception to the requirement is approved by the specific field.

*Any Special Committee may, at its discretion, require knowledge of foreign language beyond the announced requirements.*

Since the languages offered to satisfy the requirements for the Master's degree are specified by the fields, only the languages designated as meeting the requirements for the Ph.D. degree will be accepted on a transfer of Master's to Ph.D. candidacy.

**FOR THE DOCTORATE**

A candidate must pass language examinations in two foreign languages chosen from the following four: French, German, Russian, and English. The choice of English is normally permissible only to those students whose undergraduate study was completed outside the United States in a language other than English. Decisions with respect to the acceptance of English as a foreign language will be made after a student has arrived on campus. If a student is permitted to offer English as one foreign language, the second language must not be from the same "language family" as his native language. In a limited number of fields, languages other than the four designated languages may be offered in fulfillment of the languages required for the Ph.D. Individual substitutions of languages will be permitted only under very unusual circumstances.

The examination in at least one foreign language must be passed immediately upon admission to candidacy; otherwise, an additional semester of residence is required. The additional semester may be waived by the General Committee of the Graduate School upon recommendation of the student's Special Committee if preparation in one foreign language is made during a period when the candidate is not receiving credit for residence.

In order to avoid the necessity of studying a foreign language during time reserved for thesis research and composition, a candidate should complete requirements for the second foreign language as soon as possible.

*In any case, two units of residence will be required after the second language examination has been passed, and no residence may be earned beyond four units until the second language requirement is satisfied.*

A foreign student offering English as one of the two required languages may not be required to take an examination, but he should

obtain certification from the Chairman of his Special Committee that he has the necessary acquaintance with English. Forms for this purpose are available at the Graduate School Office.

## COURSES AND REGISTRATION IN COURSES

Graduate students have the privilege of registering in any University course which can accommodate them, no matter whether it is announced as primarily for graduates or undergraduates. Details regarding all offerings will be found in the Announcements of the various colleges; and to guide them to the right publication, the name of the college that lists the material has been placed after the name of the Field of Instruction (see below, pp. 49-101).

The Graduate School itself imposes no course requirements whatever. It does not regard the accumulation of credit hours as an index of the student's progress or as in any measure a guaranty that he will receive the degree. It leaves to him and the Special Committee all decisions as to which subjects he should pursue in courses and whether he has profited as he should from the work.

For the convenience of all, however, the Graduate School does require that the instructor in each course submit a grade to be entered upon the student's record; and to prevent exclusion from courses with limited enrollment, it permits a student in residence to preregister for these at an announced time during the term preceding that in which they will be offered. New students ordinarily need not preregister, but those who expect to take laboratory courses with limited facilities are advised to consult with their field representatives or major advisers.

## EXAMINATIONS

The Special Committee conducts all examinations required for the degree, but the candidate is responsible for seeing that the final examinations are scheduled with the Graduate School at least five days in advance. Formal registration as a regular student or as a "candidate for degree only" is required for all Final Examinations. The Committee may invite other members of the faculty to be present at the examination and take part in questioning the candidate. It may also require other examinations than those listed below.

The following examinations are required by the Graduate School. At the discretion of the Special Committee, they may be entirely oral or both oral and written.

*FOR THE MASTERS' DEGREES:* a Final Examination, which under certain conditions may be combined with the Qualifying Examination for the doctorate. (See *Code of Legislation*, par. 99.)

*FOR THE DOCTORS' DEGREES:* (1) A Qualifying Examination to determine the applicant's fitness for undertaking advanced studies,



and to enable the Special Committee to plan a program which will make him familiar with the requisite knowledge and techniques. An early date for this examination is therefore considered essential, and the Graduate School requires that all candidates complete three units of residence after passing it. (2) A Final Examination. Except by prior arrangement with the Graduate School, this must be taken in two parts—Examination A, given not earlier than the last month of the fourth unit of residence, and at least four months before the second part; and Examination B, on the thesis and related material. Final Examinations A, B, and C (A and B combined) are publicized so that any member of the Graduate faculty who wishes may attend.

### THESIS OR ESSAY

Every candidate for a degree must present a copy of his thesis or essay to the Graduate School and must complete other formalities incidental to making it available in the University Library. In form, it must be as described in other publications of the Graduate School, and it must satisfy the candidate's Special Committee in both scholarship and literary quality.

Since candidates for the Masters' degrees enter upon their work with various aims and considerable variety of preparation, their Special Committees will determine the importance of the thesis in rounding out each individual's program. Some students may use most of their time in attending courses in order to broaden their knowledge; for them the essay may be a secondary consideration. Others may concentrate upon pieces of research best handled in a thesis necessitating expenditure of much of their time and effort; the Special Committee will therefore strive to give such projects a prominent place in planning the candidate's work and in judging his success.

Doctoral theses should demonstrate that, in addition to becoming acquainted with materials and methods, the candidate possesses the ability and technique needed for carrying on original research. The faculty requires publication by abstract and microfilm.

## ADVANCED PROFESSIONAL DEGREES\*

*Advanced professional degrees* are designed as preparation and training for a special profession. The admissions, requirements, and curricula for such degrees, as approved by the Graduate faculty, are announced by the faculty of a professional school or college, which, for the purpose, acts as a division of the Graduate faculty. Degrees are awarded upon recommendation of the division to the Graduate faculty. Detailed information regarding admission or academic requirements for professional degrees is included in the Announcement of the separate school or college in which the degree is offered. Inquiries addressed to the Graduate School will be forwarded to the proper official. The following professional degrees are approved by the Graduate faculty:

*MASTER OF ARCHITECTURE* (M.Arch.)...Advanced training in architectural design, construction, and research. Only graduates of a five-year professional program in architecture are admitted as candidates. (Professor H. Elder)

*MASTER OF FINE ARTS* (M.F.A.)...Advanced training in the practice of painting or sculpture. (Professor J. A. Hartell)

*MASTER OF LANDSCAPE ARCHITECTURE* (M.L.A.)...Advanced training in landscape design. (Professor F. W. Edmondson)

*MASTER OF REGIONAL PLANNING* (M.R.P.)...Training for a professional career in the fields of city planning or regional planning. (Professor J. W. Reps)

The four degrees listed above are administered by the Division of Architecture and Fine Arts. Inquiries should be addressed to the listed professor.

*MASTER OF EDUCATION* (M.Ed.)...This degree is granted upon the satisfactory completion of a program of preparation for professional services in education, such as teaching, administration, student personnel work, and supervision.

\*The following are advanced degrees which are also first degrees of a school or college and therefore are not subject to the jurisdiction of the Graduate faculty. For information regarding them, address the school or college indicated:

Bachelor of Laws	Law School
Master of Aeronautical Engineering	Graduate School of Aeronautical Engineering
Master of Business Administration	} Graduate School of Business and Public Administration
Master of Public Administration	
Doctor of Medicine	Medical College, New York City
Doctor of Veterinary Medicine	Veterinary College

*DOCTOR OF EDUCATION (Ed.D.)*...The program for this degree is designed to prepare the candidate within a broad cultural context for professional leadership in a selected field of education.

The two degrees above are administered by the Division of Education.

*ENGINEERING*...Professional degrees at the Master's level are available in most of the schools of the College of Engineering. These are degrees involving specific curricula and are administered by the Engineering Division of the Graduate School. Programs leading to the following degrees have been established:

Master of Chemical Engineering (M.Ch.E.)

Master of Civil Engineering (M.C.E.)

Master of Electrical Engineering (M.E.E.)

Master of Industrial Engineering (M.I.E.)

Master of Mechanical Engineering (M.M.E.)

Master of Metallurgical Engineering (M.Met.E.)

The *Announcement of the College of Engineering* should be consulted for complete descriptions of requirements for these degrees.

*MASTER OF INDUSTRIAL AND LABOR RELATIONS (M.I.L.R.)*

...The program leading to this degree provides a basic course of graduate study for those with professional interests in industrial and labor relations and further provides limited opportunities for specialized professional study where broad competence has been established. This degree is administered by the Division of Industrial and Labor Relations.

*MASTER OF LAWS (LL.M.)*...This degree is intended primarily for a student who desires to increase his knowledge of the law by working in a specialized field.

*DOCTOR OF THE SCIENCE OF LAW (J.S.D.)*...This degree is intended for a student who desires to become a proficient scholar by original investigation into functions, administration, history, and progress of law.

The two degrees above are administered by the Division of Law.

*DOCTOR OF MUSICAL ARTS (D.M.A.)*...This degree is appropriate for mature composers who seek further professional training as well as knowledge of the other arts and humanities, both to enrich their creative perspectives and to prepare them for composition teaching at the university level. It is administered by the Department of Music, acting as a Division of the Graduate School for this purpose.

*MASTER OF NUTRITIONAL SCIENCE* (M.N.S.)... The basic training in this field emphasizes the physical and biological sciences that are essential for an understanding of the principles of nutrition. Through appropriate electives, students learn to apply these disciplines in either human or animal nutrition. This specialized training prepares them for positions in the basic or applied fields of nutrition or for more advanced graduate study.

*MASTER OF FOOD SCIENCE* (M.F.S.)... The fundamental sciences, chemistry, biochemistry, and bacteriology, that are involved in food processing and utilization are emphasized. Electives are available to meet individual needs in engineering, economics, marketing, and business administration. The specialized training serves as a preparation for technical work as related to the food industry or for more advanced graduate study.

The two degrees mentioned above are administered by the Graduate School of Nutrition. The *Announcement of the Graduate School of Nutrition* should be consulted for complete descriptions of requirements for these degrees.

*DOCTOR OF SCIENCE IN VETERINARY MEDICINE* (D.Sc. in V.M.)... This degree is characterized by a professional rather than a general research objective, and it is designed especially for experienced persons in the basic and clinical sciences who need more specific, advanced, scientific, and professional knowledge in order to equip themselves for careers in teaching and research. This degree is administered by the Division of Veterinary Medicine.

*PROPOSED NEW DEGREE FOR TEACHERS OF SCIENCE IN HIGH SCHOOLS*... The Graduate Faculty has proposed the establishment of a new curriculum leading to a Master's degree for prospective or practicing secondary school teachers of science. The proposed curriculum is designed to provide an opportunity for students currently engaged as high school teachers of science and those who propose to become high school teachers of science to obtain a sound training in all branches of basic science. The program will be offered beginning with the academic year 1959-1960, the precise designation of the degree being subject to approval of the New York State Board of Regents.

## GENERAL INFORMATION

CORNELL UNIVERSITY regularly publishes an *Announcement of General Information*, which describes the complete educational program of the University.\* It will be sent without charge to anyone writing to the Announcements Office, Cornell University. The information given below is that part which particularly relates to graduate students.

### TUITION AND FEES†

Tuition and fees become due when the student registers. Any student who fails to pay his tuition charges, other fees, and other indebtedness to the University, or who, if entitled to free tuition, fails to claim it at the Treasurer's Office and to pay his other fees within the prescribed period of grace, will be dropped from the University unless the Treasurer has granted him an extension of time to complete payment. The Treasurer is permitted to grant such an extension when, in his judgment, the circumstances of a particular case warrant his doing so. For any such extension the student is charged a fee of \$5. A reinstatement fee of \$10 is assessed against any student who is permitted to continue or return to classes after being dropped from the University for default in payments. The assessment may be waived in any instance for reasons satisfactory to the Treasurer and the Registrar, when such reasons are set forth in a written statement.

Students registering at any time during the last ten weeks of any term are required to pay tuition at the rate of 10 per cent of the regular tuition of the term for each week or fraction of a week between the day of registration and the last examination day of the term. Students registering at any time during the last five weeks in the short summer courses are required to pay tuition at the rate of 20 per cent of the term's tuition for each week or fraction of a week between the day of registration and the last examination day of the term.

*Tuition or fees may be changed by the Trustees at any time without previous notice.*

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\*Detailed descriptions of individual *courses*, however, are given only in the separate *Announcements* (catalogues) of the various colleges and schools (see list on cover).

†This statement is prepared by the Treasurer, who alone is authorized to interpret it.

**FEES PAYABLE BY GRADUATE STUDENTS****REGISTRATION DEPOSIT**

A deposit of \$28 must be made by every applicant for admission after the applicant has received notice of acceptance, unless the candidate has previously matriculated as a student at Cornell University. This deposit is used at the time of first registration to pay the matriculation fee, chest X-ray, and examination-book charge, and covers certain expenses incidental to graduation if the student receives a degree. The deposit will not be refunded to any candidate who withdraws his application after May 22 or after 20 days of his admission approval.

**TUITION**

Tuition is \$150 a term for all students registered in the Graduate School with major concentration in subjects within the state-supported colleges<sup>‡</sup> of the University. Those with major work in the School of Nutrition also pay \$150 a term. Tuition in the Field of Education is generally \$150 except in one or two cases, where it is \$512.50. All others must pay tuition of \$512.50 a term. Tuition is payable at the beginning of each term.

Upon recommendation by the appropriate college dean and by action of the Controller, for each appointment in a state-sponsored school or college, waiver of tuition in the Graduate School may be made to a member of the teaching or scientific staff, whose major field of study is in a state-supported school or college.

Assistants in state-supported schools or colleges on a twelve-month appointment who are registered for Summer Research for credit in the Graduate School may be recommended for waiver of tuition during the summer period under the above limitations. This waiver of tuition does not apply if the student registers in the Summer School or is not doing productive work for the Department.

An assistant, research associate, or instructor registered in the Graduate School, whose appointment does not carry free tuition, shall pay tuition according to residence eligibility. If the student is to receive less than three-quarters of full residence credit because of his appointment, he may apply to the Treasurer for proration of tuition on the basis of the maximum residence credit that may be earned.

A candidate for the Ph.D. or Ed.D. degree whose studies have been satisfactory to the faculty is exempted from the further payment of tuition upon presenting to the Treasurer at the beginning of each term a certification from the Dean of the Graduate School that the minimum residence requirement for the degree has been completed.

**COLLEGE AND UNIVERSITY FEE**

A fee of \$112.50, payable at the beginning of each term, is required of all students registered in the Graduate School. This general fee contributes toward the services supplied by the libraries, Clinic and Infirmary, and the student union in Willard Straight Hall, and pays a portion of the extra cost of laboratory courses and general administration.

<sup>‡</sup>The state-supported colleges are Agriculture, Home Economics, Industrial and Labor Relations, and Veterinary.



A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, shall register as a "candidate for degree only" and shall pay a fee of \$35.

#### **NONRESIDENT FEE**

A fee of \$50 a year will be charged each student who takes a leave of absence or fails to register for the next academic term. Candidates who complete all degree requirements within one year of their leave of absence will be exempted from the \$50 fee.

#### **A THESIS FEE**

Each doctoral candidate must pay \$30 at the time of depositing the approved thesis and abstract in final form. This fee covers the cost of preparing a master microfilm of the entire thesis; of publishing the abstract in the bimonthly periodical, *Dissertation Abstracts*; of mailing the microfilm and abstract to the microfilm publisher; and of binding both copies of the thesis for deposit in the University Library.

#### **LIMITED REFUNDS**

Part of the tuition and College and University Fee will be refunded to students who officially withdraw during the first nine weeks of a term. A student arranges for withdrawal at the Graduate School Office. Students who withdraw are charged tuition and College and University Fee at the rate of 10 per cent for each week or fraction of a week from registration to the effective date of withdrawal. No charge is made if the student withdraws within six days of registration. No part of the registration or matriculation fee is refundable.

#### **FEES FOR THE SUMMER SCHOOL**

Graduate students who attend classes in the Summer Session must register both in the Graduate School and in the Summer Session; they must pay the tuition and fees listed in the *Announcement of the Summer School*.

#### **SUMMER RESEARCH**

Students carrying on Summer Research are required to register with the Registrar as well as in the Graduate School Office.

Students registered for Summer Research, if they desire residence units for their work, must pay the tuition proportionate to the unit period in regular terms. Such students must pay one-half (\$56.25) of the College and University general fee if the period is eight weeks, or the full fee (\$112.50) if the period is more than eight weeks. Such payment admits the student to the current Summer Session classes without additional tuition payments, provided that the tuition paid is at

least equal to that charged students registered in the Summer Session. Students registered for Summer Research, but not expecting to earn residence credit, are exempt from the payment of tuition, but may not attend, either as visitors or for subsequent credit, any of the classes or exercises of the Summer Session.

#### **IN ABSENTIA**

A graduate student registered *in absentia* will pay a fee of \$35 each term.

#### **MOTOR VEHICLE REGISTRATION AND FEES**

Any student, unless he has the rank of instructor in Cornell University, who owns, maintains, or, for his own benefit, operates a motor-driven vehicle in Tompkins County, is required to register his vehicle in person with the Safety Division and to pay a registration fee of \$4 a year. (a) The student must be legally qualified to operate a motor-driven vehicle in New York State; (b) the vehicle must be registered in New York State or legally qualified to operate on the highways of New York State; (c) any motor-driven vehicle must be effectively insured against public liability for personal injury and property damage for the minimum of \$10,000—\$20,000—\$5,000 for the duration of such registration and while the vehicle is under the control of the registered student. This registration, which includes obtaining a registration sticker and paying the fee, must be completed on the registration day assigned at the beginning of the fall term, if the student is then subject to the rule. If he becomes subject to the rule after the registration day assignment, he has 48 hours within which to comply with it. Late registration of a vehicle makes the student liable to a fine of \$10 and suspension of driving privileges.

Motorcycles, motor scooters, and motor bikes must be registered and insured but may not be used anywhere on the campus without a permit.

#### **STUDENT PARKING ON CAMPUS**

Students *may not* park on campus from 8 a.m. to 5 p.m., Monday through Friday, and from 8 a.m. to 1 p.m., Saturdays, and from two days prior to the day of registration in the fall to the last day of examinations in the spring, and during the summer session. Dormitory parking is restricted at all times to holders of special dormitory parking permits.

The student's registration in the University is held to constitute an agreement on his part that he will abide by its rules and regulations with regard to traffic and parking or suffer the penalty prescribed for any violation of them. All privileges here indicated may be denied a student who is not in good standing.



## FELLOWSHIPS AND SCHOLARSHIPS

A *fellowship* ordinarily is awarded in open competition to a full-time student proceeding toward a higher degree. The award is made as a tax-exempt gift, and it covers not only tuition and fees but also a substantial contribution toward living expenses during tenure. A student who holds a fellowship is free to select his own research project, and his primary responsibility is to prosecute his studies for his degree. The award of the fellowship does not obligate the holder to render services to the University as an assistant in teaching or otherwise, nor does it commit him in respect to future employment. The holder of a fellowship may not accept any other appointment.

A *scholarship* is likewise a gift and is free from income tax, but the amount of the award usually is less than that of a fellowship. It generally covers expenses such as tuition and fees (or similar cash grant) without a material contribution to living expenses. The holder of a scholarship may, on approval of the Fellowship Board, accept another appointment.

Both fellowships and scholarships are awarded primarily on the basis of scholastic ability and promise of achievement as a graduate student. Financial need will also be considered in the award of scholarships but not of fellowships.

Application for a fellowship or scholarship is made to the Graduate School, 125 Edmund Ezra Day Hall, Cornell University, on a form obtained from that office. (Foreign students outside the country do not submit a formal application.) The applicant either must be a matriculated student in the Graduate School or must have filed an application for admission with necessary credentials. Filing application for admission does not obligate the applicant. *The applications for admission and fellowship or scholarship should be filed simultaneously.*

Under the rules of the Association of Graduate Schools, the regular time for notification of award of fellowships and scholarships for an academic year is April 1. *All fellowship and scholarship applications received by the deadline date (see Calendar) will be considered for April 1 awards, and on that day each applicant will be notified as to whether he has or has not been appointed or named as an alternate for a fellowship or scholarship.* The applicant is allowed until April 15 to notify the Graduate School whether or not he will accept the award. Applications received after February 13 may be considered at a later date if vacancies occur due to withdrawal of principals and alternates or for other reasons. Fellowships and scholarships are usually granted for an academic year, but under some conditions may be awarded for a single semester or for a Summer Research period.

The fellowships and scholarships available for 1960-1961 and 1961-1962 are listed below.\* Tuition for the academic year for students whose major work is in fields of the *endowed* institutions is \$1025, and for students whose major work is in fields of the *state* institutions, it is \$300. The Graduate School Office also maintains various files of fellowships and scholarships in addition to those listed below.

## OPEN TO APPLICANTS IN ALL FIELDS

*Cornell University Senior Graduate Fellowships* (four) \$2525-\$3250

Stipend \$2000, tuition \$300 or \$1025, fees \$225. For candidates near the completion of study for the doctorate. A travel allowance may be granted in place of tuition.

*Andrew D. White Fellowships* (four) \$2525-\$3250

Stipend \$2000, tuition \$300 or \$1025, fees \$225. For new students of exceptionally outstanding promise. A dependency allowance may be granted.

*Cornell University Graduate Fellowships* (forty) \$2025-\$2750

Stipend \$1500, tuition \$300 or \$1025, fees \$225. Primarily for outstanding new students. A dependency allowance may be granted.

*Cornell University—Woodrow Wilson Fellowships* (variable) \$2025-\$2750

Stipend \$1500, tuition \$300 or \$1025, fees \$225. Primarily for second-year graduate students who expect to go into college teaching.

*Allen Seymour Olmsted Fellowships* (two) \$1025-\$2750

Stipend \$1500, tuition \$300 or \$1025, fees \$225. Primarily for registered students.

*Glasgow University Exchange Fellowship*

Tuition, board, room and an allowance of \$400 for travel. Limited to matriculated students for one year of study at Glasgow University.

*Cornell University Exchange Fellowship* \$2025-\$2750

Stipend \$1500, tuition \$300 or \$1025, fees \$225. Also Fulbright travel grant from Scotland to U.S.A. and return. Limited to matriculated students at Glasgow University for one year of study at the Cornell University Graduate School.

*Tuition Scholarships* \$300-\$1250

For new or matriculated students. A statement of financial need is required. Most of the grants include fees as well as tuition.

*Cornell University Travel Grant* \$300

Preference given to students in the Field of History.

*China Training Fellowships* up to \$3250

Stipend \$500-\$2000, tuition \$300 or \$1025, fees \$225. Open to candidates in the China Program. Apply to the Director of the program, Franklin Hall.

*Southeast Asia Training Fellowships* up to \$3250

Stipend \$500-\$2000, tuition \$300 or \$1025, fees \$225. Open to candidates in the Southeast Asia Program. Apply to the Director of the program, Franklin Hall. (See Interdepartmental Programs, p. 47.)

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\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.

## HUMANITIES

### OPEN TO MORE THAN ONE FIELD

*George Lincoln Burr Fellowship* \$3150

Stipend \$1900, tuition \$1025, fees \$225. Open to Ph.D. candidates concentrating in medieval and renaissance study. For specific information write to the Chairman, Interdepartmental Committee on Medieval and Renaissance Study, Goldwin Smith Hall. (See Interdepartmental Programs, p. 46.)

*Florence May Smith Fellowships* (four) \$2750

Stipend \$1500, tuition \$1025, fees \$225. Open to graduate students in the Classics, romance literature, and German literature. Preference will be given to students of the Classics.

## ARCHITECTURE

*University Scholarship* \$1425

Stipend \$175, tuition \$1025, fees \$225.

## CLASSICS

*University Fellowship* \$1350

Stipend \$100, tuition \$1025, fees \$225.

*University Scholarship* \$1250

Tuition \$1025, fees \$225.

## ENGLISH LANGUAGE AND LITERATURE

*Class of 1916 Graduate Fellowship* \$2750

Stipend \$1500, tuition \$1025, fees \$225. Ordinarily awarded each year.

*Martin Sampson Teaching Fellowship* \$1650 plus part-time assistantship

Stipend \$400 (plus assistantship salary), tuition \$1025, fees \$225.

## PHILOSOPHY

*Susan Linn Sage Fellowships* (two) \$2150

Stipend \$900, tuition \$1025, fees \$225.

## ROMANCE STUDIES

*University Fellowship* \$2050

Stipend \$800, tuition \$1025, fees \$225. Not available in 1960-61.

## SOCIAL SCIENCES

### OPEN TO MORE THAN ONE FIELD

*Anna Cora Smith Scholarship in Home Economics* \$700

Stipend \$175, tuition \$300, fees \$225.

\**General Foods Fellowships in Home Economics* (two) \$3000

Stipend \$2475, tuition \$300, fees \$225.

*Katharine Wyckoff Harris Fellowship in Home Economics* \$2000

Stipend \$1475, tuition \$300, fees \$225.

*Clinton DeWitt Smith Fellowship in Agriculture* \$1325

See BIOLOGICAL SCIENCES

*Henry Strong Denison Fellowships in Agriculture* \$1525

See BIOLOGICAL SCIENCES

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\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.

*Cornell Sigma Xi Fellowship* up to \$2025 or \$2750

See BIOLOGICAL SCIENCES

*George Lincoln Burr Fellowship* \$3150

Stipend \$1900, tuition \$1025, fees \$225. Open to Ph.D. candidates concentrating in medieval and renaissance study. For specific information write to the Chairman, Interdepartmental Committee on Medieval and Renaissance Study, Goldwin Smith Hall. (See Interdepartmental Programs, p. 46.)

\**General Electric Fellowship in Group Relations in Industry* \$2275 to \$3750

Stipend \$1750 (single), \$2100 (married), \$2500 (married with one or more children), tuition \$300 or \$1025, fees \$225.

#### BUSINESS AND PUBLIC ADMINISTRATION

\**Cornell Aeronautical Laboratory Inc. Fellowship* \$2850

Stipend \$1600, tuition \$1025, fees \$225. Open to either Master's or Ph.D. candidates.

#### CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS

\**Grant Foundation Fellowships in Family Life Education* (two) \$2500

Stipend \$1975, tuition \$300, fees \$225.

\**National Institute of Mental Health Traineeships* (two) \$1800 to \$3000

Stipend \$1275-\$2475, tuition \$300, fees \$225.

#### ECONOMICS

*Robert Irving Warshow Fellowship* \$2750

Stipend \$1500, tuition \$1025, fees \$225.

*President White Fellowship* \$2250

Stipend \$1000, tuition \$1025, fees \$225.

#### ECONOMICS OF THE HOUSEHOLD AND HOUSEHOLD MANAGEMENT

*Helen Canon Scholarship* \$250

Stipend \$250, tuition and fees not included.

#### EDUCATION AND RURAL EDUCATION

\**Du Pont Fellowships in Mathematics and Science Teaching* (six) \$1725-\$2450

Stipend \$1200, tuition \$300 or \$1025, fees \$225. Open to graduates of liberal arts colleges who are seeking preparation for high school teaching.

\**International Nickel Company Fellowship for Mathematics and Science Teachers* \$3000

Stipend \$2475, tuition \$300, fees \$225.

\**Shell Fellowship in Math and Science Teaching* \$3025 or \$3750

Stipend \$2500, tuition \$300 or \$1025, fees \$225. Preference given to doctoral candidates. May major in chemistry or mathematics as well as education.

*Comstock Scholarship in Nature Study* \$525

Tuition \$300, fees \$225.

#### HISTORY

*Martha B. Barrett Scholarship in European History* \$2250

Stipend \$1000, tuition \$1025, fees \$225. May not be offered in 1961-1962.

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\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.

*George C. Boldt Fellowship* \$2550

Stipend \$1300, tuition \$1025, fees \$225.

*Gertrude A. Gillmore Research Fellowship* \$1500

Stipend \$1500, plus tuition and fees if needed. Open to women students who are ordinarily in their last year of work for the doctorate.

*President White Fellowship* \$2350

Stipend \$1100, tuition \$1025, fees \$225.

## INDUSTRIAL AND LABOR RELATIONS

*\*Ford Foundation Master Fellowship* \$3000

Stipend \$3000, no tuition or fees included. Open to doctoral candidates working on full-time thesis research on topics having to do with the application of the behavioral sciences to problems of the business institution.

*Industrial and Labor Relations Graduate Fellowship* \$3000

Stipend \$3000, no tuition or fees included. Preference given to doctoral candidates but may be awarded to those pursuing work for the Master's degree.

*Tuition Scholarships* (four) \$300

Primarily for foreign students.

## BIOLOGICAL SCIENCES

### OPEN TO MORE THAN ONE FIELD

*\*Shell Fellowship in Plant Sciences* \$2325 or \$2625

Stipend \$1800 or \$2100 (married with one or more children), tuition \$300, fees \$225. Candidate should be U.S. or Canadian citizen and in his second or third year, or higher, of graduate study.

*Schlyer-Gage Fellowship in Animal Sciences* \$1925 or \$2650

Stipend \$1400, tuition \$300 or \$1025, fees \$225. Open to candidates in the Fields of Biochemistry, Conservation, Entomology, and Zoology.

*\*Allied Chemical Corporation Fellowship* \$2025 or \$2525

Stipend \$1500 (single), \$2000 (married), tuition \$300, fees \$225. Available to candidates in the Field of Entomology in 1960-1961 and those in the Field of Plant Pathology in 1961-1962. Candidates must be U.S. citizens, preferably in final year of the doctorate.

*Cornell Sigma Xi Fellowship* \$2025 or \$2750

Stipend up to \$1500, tuition \$300 or \$1025, fees \$225. Open to candidates in the Field of Anthropology, and the Areas of the Biological and Physical Sciences.

*Henry Strong Denison Fellowship in Agriculture* (three) \$1525

Stipend \$1000, tuition \$300, fees \$225. Open to candidates in the plant sciences, animal sciences, and social sciences (agricultural engineering, agricultural economics, rural education and rural sociology). Preference will be given to those candidates who expect to complete the requirements for the doctorate and who appear most promising from the standpoint of ability to conduct research.

*Clinton DeWitt Smith Fellowship in Agriculture* \$1325

Stipend \$800, tuition \$300, fees \$225. Open to students who come from farm homes and who have had farm training. Not available in 1961-1962.

*Woods Hole Summer Scholarships* \$150

Stipend of \$150 to be used to cover tuition for a six-week summer session at the Marine Biological Laboratory, Woods Hole, Massachusetts.

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\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.

### ANIMAL HUSBANDRY

*Morrison Fellowship in Livestock Feeding* \$2025  
Stipend \$1500, tuition \$300, fees \$225.

### ENTOMOLOGY

*Comstock Scholarship* \$525  
Tuition \$300, fees \$225.

### FLORICULTURE AND ORNAMENTAL HORTICULTURE

*Alfred Hottes Amateur Gardening Scholarship* \$1800  
Stipend \$1275, tuition \$300, fees \$225.

### PSYCHOLOGY

*Susan Linn Sage Fellowship* \$2450  
Stipend \$1200, tuition \$1025, fees \$225. Not available in 1960-1961.  
*Dallenbach Fellowship* \$2450  
Stipend \$1200, tuition \$1025, fees \$225.  
\**National Institute of Mental Health Traineeships* \$3150  
Stipend \$1800, tuition \$1025, fees \$225. For entering graduate students.

### PHYSICAL SCIENCES

#### OPEN TO MORE THAN ONE FIELD

\**Cornell Aeronautical Laboratory ROTC Fellowship* \$2850  
Stipend \$1600, tuition \$1025, fees \$225.

*Cornell Sigma Xi Fellowship* up to \$2025 or \$2750  
See BIOLOGICAL SCIENCES

*John McMullen Graduate Scholarships or Fellowships* (eight) up to \$2750  
Stipend \$500-\$1500, tuition \$1025, fees \$225. Open to candidates in engineering.  
Apply to the head of the department.

\**Allegheny Ludlum Corporation Fellowship* \$2850 or \$3350  
Stipend \$1600 (single), \$2100 (married), tuition \$1025, fees \$225. Available to students in the Fields of Mechanical Engineering or Engineering Mechanics and Materials.

\**Hannibal Ford Fellowship* \$3750  
Stipend \$2500, tuition \$1025, fees \$225. Available to students who are American citizens and in their first year of graduate study, or to those who have completed no more than a limited amount of auxiliary study at the graduate level in the Fields of Electrical Engineering, Mechanical Engineering, Engineering Physics, or Engineering Mechanics and Materials.

\**IBM Fellowship* \$3050 or \$3750  
Stipend \$1800 (single or married), \$2500 (married with children), tuition \$1025, fees \$225. Open to students in the Fields of Physics, Electrical Engineering, or Mechanical Engineering.

\**Sperry-Gyroscope Fellowship* \$2650  
Stipend \$1400, tuition \$1025, fees \$225. Open to candidates in the Fields of Electrical Engineering, Mechanical Engineering, and Engineering Physics.

\**Eastman Kodak Fellowship in Engineering* \$2000  
Stipend \$750, tuition \$1025, fees \$225. Open to an American citizen earning an M.S. degree in engineering. Preference is given to students in the Fields of Chemical Engineering, Mechanical Engineering, and Electrical Engineering.

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\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.



- \**Union Carbide and Carbon Fellowship* \$2750 or \$3350  
Stipend \$1500 (single), \$2100 (married), must be a Ph.D. candidate, tuition \$1025, fees \$225. Alternates between the Fields of Mechanical Engineering and Chemical Engineering.

## AERONAUTICAL ENGINEERING

- \**Avco Manufacturing Corporation Fellowship* \$2850  
Stipend \$1600, tuition \$1025, fees \$225.
- \**Curtiss-Wright Corporation Fellowship* \$2850  
Stipend \$1600, tuition \$1025, fees \$225.
- \**Fairchild Engine and Aeroplane Corporation Fellowship* \$2850  
Stipend \$1600, tuition \$1025, fees \$225.
- \**Grumman Corporation Fellowship* \$2850  
Stipend \$1600, tuition \$1025, fees \$225.
- \**Douglas Aircraft Company Fellowship* \$2150  
Stipend \$900, tuition \$1025, fees \$225.

## CHEMICAL ENGINEERING

- \**American Cyanamide Company Summer Research Scholarships* (three) \$662.50  
Stipend \$350, tuition and fees \$312.50.
- \**Procter and Gamble Company Fellowship* \$3050 or \$3350  
Stipend \$1800, \$2100 (married and in last year prior to doctorate), tuition \$1025, fees \$225.
- \**Standard Oil Company of California Fellowship* \$2750  
Stipend \$1500, tuition \$1025, fees \$225.

## CHEMISTRY

- \**American Cyanamid Company Summer Research Scholarships* (three) \$662.50  
Stipend \$350, tuition and fees \$312.50.
- \**American Viscose Corporation Summer Research Scholarships* (five) \$662.50  
Stipend \$350, tuition and fees \$312.50.
- \**Dow Chemical Company Summer Research Scholarships* (seven) \$350  
Stipend \$350, tuition and fees not included.
- \**Du Pont Summer Research Scholarships* (eleven) \$150-\$350  
Stipend \$150 to \$350, tuition and fees not included.
- \**Procter and Gamble Summer Research Scholarships* (seven) \$50-\$350  
Stipend \$50 to \$350, tuition and fees not included.
- Sage Summer Research Scholarships* (two) \$556.25  
Stipend \$300, tuition \$256.25.
- Schluederberg Summer Research Scholarship* \$556.25  
Stipend \$300, tuition \$256.25.
- John E. Teeple Summer Research Scholarships* (four) \$556.25  
Stipend \$300, tuition \$256.25.
- \**Allied Chemical Corporation Fellowship* \$2750 or \$3250  
Stipend \$1500 (single), \$2000 (married), tuition \$1025, fees \$225.
- \**General Electric Fellowship* \$3000, \$3350, \$3750  
Stipend \$1750 (single), \$2100 (married), \$2500 (married with one or more children).

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\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.

## 34 CORNELL GRADUATE SCHOOL

\**Monsanto Chemical Fellowship* \$3000

Stipend \$1750, tuition \$1025, fees \$225.

\**Procter and Gamble Fellowship* \$3050 or \$3350

Stipend \$1800 (single), \$2100 (married), tuition \$1025, fees \$225.

\**United States Rubber Postgraduate Fellowship* \$3050 or \$3350

Stipend \$1800 (single or married), \$2100 with children under school age, tuition \$1025, fees \$225.

### CIVIL ENGINEERING

†*McGraw Scholarship* \$1425

Stipend \$175, tuition \$1025, fees \$225.

†*University Scholarship* \$1250

Tuition \$1025, fees \$225.

†*Elon Huntington Hooker Scholarship in Hydraulics* \$1575

Stipend \$325, tuition \$1025, fees \$225.

\**New York State Bituminous Concrete Producers Association Scholarship* \$2150

Stipend \$900, tuition \$1025, fees \$225.

### ELECTRICAL ENGINEERING

*Charles Bull Earle Memorial Scholarship* \$1475

Stipend \$225, tuition \$1025, fees \$225.

\**Bell Aircraft Corporation Fellowship* \$2850

Stipend \$1600, tuition \$1025, fees \$225.

\**Republic Aviation Corporation Fellowship* \$2850

Stipend \$1600, tuition \$1025, fees \$225.

\**United States Steel Foundation Fellowship* \$2750 or \$3350

Stipend \$1500 (single), \$2100 (married), tuition \$1025, fees \$225.

### ENGINEERING PHYSICS

\**Avco Graduate Fellowship* \$3050

Stipend \$1800, tuition \$1025, fees \$225.

\**Radio Corporation of America Fellowship* \$3350

Stipend \$2100, tuition \$1025, fees \$225.

### GEOLOGY AND GEOGRAPHY

*Eleanor Tatum Long Fellowship* \$2250

Stipend \$1000, tuition \$1025, fees \$225.

### MATHEMATICS

*Erastus Brooks Fellowship* \$2450

Stipend \$1200, tuition \$1025, fees \$225.

### MECHANICAL ENGINEERING

*Edgar J. Meyer Scholarship* \$1475

Stipend \$225, tuition \$1025, fees \$225.

*Sibley Scholarship* \$1425

Stipend \$175, tuition \$1025, fees \$225.

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\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.

†The stipends of the McGraw, University, and Hooker Scholarships are augmented by McMullen Scholarship funds to make a stipend of \$800-\$1000.



*Ethyl Corporation Fellowship* \$3050

Stipend \$1800, tuition \$1025, fees \$225.

\**Procter and Gamble Fellowship* \$2650 or \$3350

Stipend \$1400 (single), \$2100 (married), tuition \$1025, fees \$225.

\**Sohio Fellowship* \$2750

Stipend \$1500, tuition \$1025, fees \$225.

\**Westinghouse Educational Foundation Fellowship* \$1700

Stipend \$1000, \$700 toward tuition.

## PHYSICS

\**Corning Glass Predoctoral Fellowship* \$3350

Stipend \$2100, tuition \$1025, fees \$225.

\**Eastman Kodak Fellowship* \$3250 or \$3750

Stipend \$2000 (single or married), \$2500 (married with dependent children), tuition \$1025, fees \$225.

\**General Electric Fellowship* \$3000, \$3350, or \$3750

Stipend \$1750 (single), \$2100 (married), \$2500 (married with one or more children), tuition \$1025, fees \$225.

*Raytheon Fellowship* \$3050

Stipend \$1800, tuition \$1025, fees \$225.

## PRIZES

Several University prizes are open for competition to all students, including graduate students; the Committee on Prizes of the University faculty publishes an *Announcement of Prize Competitions*, which may be obtained from the Visitor Information Center, Edmund Ezra Day Hall.

Two other prizes are open exclusively to graduate students:

**THE GUILFORD ESSAY PRIZE...** Until at least 1962, a special scholarship of \$120 will be assigned annually to that graduate student who, in the judgment of the Graduate faculty, writes the best English prose. Each competitor must submit, at or before 12 o'clock of the last Monday in November, specimens of his English prose, preferably prepared as a normal part of his training in candidacy for an advanced degree.

**THE PHILOSOPHY PRIZE...** A prize of \$50 is awarded to the graduate student who submits the best paper embodying the results of research in the field of philosophy. The subject of the paper may be historical or critical or constructive. It may be concerned either with problems of pure philosophy or with the philosophical bearing of the concepts and methods of the sciences. Papers must be submitted on or before the first day of May. A student may not submit more than one paper.

Papers submitted in competition for either prize must be typewritten on bond paper (a clean *ribbon* copy), double-spaced, at least 1500 and not more than 5000 words in length, and signed with an assumed name, the real name and address of the competitor being enclosed in a sealed envelope, superscribed with the assumed name. They are to be deposited in the Office of the Graduate School.

\*The Special Temporary Fellowships are marked with an asterisk, and their listing is based on their availability in 1959-1960.

## LOANS

Contributions from the alumni of Cornell University have made possible the establishment of a Graduate Student Loan Fund for use of graduate students already enrolled in Cornell University in case of financial emergency. Usually a term of successful residence is required before loans are granted. Applications should be made to the Office of Financial Aids, Edmund Ezra Day Hall.

## ASSISTANTSHIPS

The colleges, schools, and departments of the University regularly contract for the assistance of graduate students in teaching, research, and administration. The contracting parties and the faculty of the Graduate School see that appointments and assignment of duties are made with proper consideration for the candidate's graduate program. Usually the duties of the assistant lie in the field of his major interest and contribute to his intellectual and technical proficiency in the field. Assistants are eligible for residence units in candidacy for advanced degrees according to regulations of the Graduate faculty. Normally an assistant who is called upon for services not exceeding twenty clock-hours a week is eligible for three-fourths of a unit each term, but by earning an additional one-half unit in subsequent Summer Research, he may earn two units in one calendar year. Assistantship stipends have a wide range, but an appointment ordinarily would at least cover the cost of room and board and tuition and fees. Those desiring appointment should apply to the head of the department concerned. Applications mistakenly addressed to the Graduate School are forwarded to the proper department.

## GRADUATE ASSISTANTS IN PERSONNEL

These assistantships are designed for graduate students interested in student personnel administration as a major or minor field. Appointees are given responsibility within the University student personnel program, including residence duties, office experience, or projects of a similar nature. The assistantship for majors in guidance and personnel administration is the equivalent of room, board, and tuition. (Apartments are available for married couples in the men's residences.) Applications should be addressed to the Office of Dean of Men and Dean of Women, Edmund Ezra Day Hall.

## OTHER EMPLOYMENT

Additional opportunities for part-time work are often available in connection with departmental research projects or other activities. Applications for this type of work should be made directly to the

department concerned. If a candidate is employed in research or other work closely allied to his academic interest, he may find such employment valuable.

Progress in candidacy is difficult when a student attempts to support himself wholly or partially by work unrelated to his field. It usually is sounder economy to borrow from the Graduate Student Loan Fund and keep employment to a minimum. The University maintains a part-time student employment service, however, in the Office of Financial Aids.

## LIVING ARRANGEMENTS

The University has established Cascadilla Hall as an all-graduate dormitory. The north wing is for graduate women, and the south wing is for graduate men. Applications for this dormitory may be made any time after January 1 for the coming academic year.

Cascadilla Hall, a campus landmark since 1858, is conveniently located in the southwest corner of the campus, adjacent to a small shopping community, "College Town." On the first floor, common to all residents, are social and recreational areas. Student rooms and suites are spacious and the furnishings are adequate and comfortable.

Facilities for married students include a 96-unit housing development, known as Pleasant Grove Apartments, with 64 one-bedroom and 32 two-bedroom apartments for married graduate students, and Cornell Quarters with 34 duplex dwellings, each containing two two-room apartments and 16 four-room cottages. All apartments and cottages are rented unfurnished and exclusive of utilities except water.

Application forms and more detailed information on all types of graduate housing may be obtained by writing the Department of Residential Halls, Edmund Ezra Day Hall.

An Off-campus Housing Office is maintained by the Department of Residential Halls to assist married students and those single students who do not wish to live in a University dormitory.

## HEALTH SERVICES AND MEDICAL CARE

The health services and medical care of Cornell students are centered in the University's Gannett Medical Clinic (out-patient department) and in the Cornell Infirmary (hospital). Students may consult a physician at the Clinic whenever need arises and receive treatment in cases that do not require hospitalization. If hospital care is indicated, the student is requested to enter the Infirmary. For details of the health and medical services covered by the student's College and University General Fee, see the *Announcement of General Information*. On a voluntary basis, insurance is available to supplement the services

provided by the general fee; information about such insurance may be obtained at the Gannett Medical Clinic.

If a student prefers to consult a private physician rather than go to the Clinic, or to have the services of a private doctor while a patient in the Infirmary, he must bear the cost of these services.

## HEALTH REQUIREMENTS ON ENTRANCE

The following health requirements for entering graduate students have been adopted by the Board of Trustees of Cornell University. The Board has also ruled that failure to fulfill these requirements will result in a recommendation to the Registrar that the student be denied the privilege of registering the following term.

### IMMUNIZATION

A satisfactory certificate of immunization against smallpox, on the form supplied by the University, must be submitted before registration. It will be accepted as satisfactory only if it certifies that within the last three years a successful vaccination has been performed. If this requirement cannot be fulfilled by the student's home physician, opportunity for immunization will be offered by the Cornell medical staff during the student's first semester, with the cost to be borne by the student. If a student has been absent from the University for more than three years, immunity will be considered to have lapsed.

### HEALTH HISTORY

Students accepted for admission will be required to submit health histories on forms supplied by the University.

### X-RAY

Every student is required to have a chest X-ray. He may present a chest film, made by a private physician, on or before entering Cornell, provided that it was obtained within six months of initial registration and is of acceptable quality; *or* he may present a chest X-ray report, provided that the radiograph was taken within the six months of initial registration, contains the film number and name and address of the X-ray facility, and is signed by a radiologist; *or* he may obtain the chest X-ray at Cornell during the registration period or during his first semester (in which case, the charge, covering also any necessary recheck films, will be included in the general University fee).

## COUNSELING

The University maintains a variety of counseling services available to graduate students. The primary academic counselors are the mem-

bers of the Special Committee. Other counselors, who are able to help in matters involving personal questions, information on part-time employment, or selective service, will be found in the Office of the Dean of Men and Dean of Women.

## PLACEMENT

The University Placement Service makes arrangements for interviews on and off campus with employers, supervises the assembling and presentation of personnel records, and assists Cornell men and women who are ready for positions in business and industry. The Educational Placement Service performs a similar function for those whose vocation is teaching. Many of the professional schools and colleges maintain separate placement offices for the special professions; their services are available to registered graduate students and alumni.

## MILITARY TRAINING

The third and fourth years of advanced ROTC are elective and qualify a student for appointment as a Second Lieutenant in the U.S. Army Reserve or the Regular Army. These courses are open, within quota limitations, to graduate students who have satisfactorily completed a basic course in ROTC while undergraduates or those who are veterans with equivalent military training and are enrolled in a two-year, or longer, graduate program leading to a degree. Interested graduate students should apply to the Professor of Military Science and Tactics, Barton Hall, for further information or enrollment. See the *Announcement of Independent Divisions and Departments* for additional details and specific courses offered.

## FOREIGN STUDENTS

Applications and all necessary credentials for admission should be filed by foreign students several months before registration day. No student should apply who has not mastered colloquial English.

Before applying, a student from another country should be certain that he has sufficient available funds in dollars to meet all necessary expenses. Because of his unfamiliarity with local patterns of living and buying, he will need to calculate a somewhat higher amount for board, room, and travel than the amounts cited in this Announcement and elsewhere. He should, also, make arrangements for additional help in the event of protracted illness or other emergency. *Students from foreign countries whose native language is not English or whose preparation differs from that of citizens of the United States should not expect to receive their degrees at the end of the minimum residence*



*period.* Moreover, agencies subsidizing such students should be prepared to support them for a longer period. Such students are usually unable to qualify for assistantships or for other appointments yielding financial assistance during the first year of residence.

Within these limits, Cornell University welcomes students from other countries. In 1958-59, there were over 700 foreign students from 79 foreign countries registered in the University. A Foreign Student Office is maintained by the University to look after the welfare of all students from other countries. The staff of the office, under the direction of David B. Williams, may be consulted on personal problems, social questions, or any of the technical questions or intergovernmental problems that may arise in connection with a foreign student's stay in this country. The Foreign Student Office is located in Edmund Ezra Day Hall.

## ACTIVITIES FOR GRADUATE STUDENTS

There are places for graduate students in some extracurricular activities shared by undergraduates, such as intramural sports, drama, publications, music and the other arts, and additional areas of special interest. In the main, however, by reason of maturity and different interests, graduate students have their own organizations. More than twenty-five such organizations center in academic fields or groups of fields; some are purely social, others informally academic. As an instance, one club in existence since 1907, made up of over one hundred faculty and graduate student members interested in plant breeding and genetics, meets bimonthly for a dinner prepared by its members, after which the members hold an hour's discussion on some topic outside those fields, led by an invited visitor. Gamma Alpha is the only graduate fraternity which operates its own house, with facilities for both room and board; its membership is limited to students of physical and natural science—broadly interpreted. Other fraternities and sororities limited to graduate students and faculty are in some instances social, in others academic or honorary. There are general organizations interested in politics, home life, art, etc. The Grad Wives Club thrives; in addition to regular meetings for its more than one hundred members, interest groups meet separately. Additional information on these groups is available in the Office of the Dean of Men and Dean of Women.

*WILLARD STRAIGHT HALL* is the center of social life, both graduate and undergraduate. Supported by University fees included in the tuition and fees listed above, it supplies facilities for graduate groups and plans special functions for them. There is a graduate representative on the Board of Managers.



*CORNELL UNITED RELIGIOUS WORK (CURW)* includes a range of activities for graduate students. Its offices are in Anabel Taylor Hall, which serves as the headquarters for pastors who represent several denominations and who may be consulted by students.

*SAGE CHAPEL*, where nonsectarian services each Sunday are led by distinguished guest speakers, is maintained by the University. Graduate students are eligible for its trained choir.

*CORNELL'S LOCATION* in the Finger Lakes region of New York State stimulates outdoor activity. Agencies of the University operate an outdoor swimming pool, a golf course, a ski run with ski tow (twelve miles from the campus), riding classes, and other outdoor facilities. There are three large state parks within ten miles of the campus. Departments of the University plan field trips for various purposes, including ornithological, geological, agricultural, and industrial, which are open to interested graduate students.

## **RESOURCES FOR RESEARCH AND ADVANCED STUDY**

For many fields of study offered at Cornell substantial collections and facilities, in many instances unique, have been assembled for the use of graduate students. They are not described in this Announcement. The Graduate School does not conduct programs leading to advanced degrees in fields inadequately equipped for such purposes.

The descriptions below are limited to major general facilities at the service of graduate students in any of a variety of fields of instruction.

### **OFFICE OF VICE PRESIDENT FOR RESEARCH**

Established in part to aid members of the faculty in arranging for outside sponsorship, chiefly by industry, government, and foundations, of cooperative research programs of interest and concern to faculty and their students, this office advised and assisted in administering research projects in the University to the amount of more than thirty and a half million dollars during 1958-1959. All phases of human endeavor were represented, the largest being 48.6 per cent in aeronautics (the work of the Cornell Aeronautical Laboratory at Buffalo). The remainder represents substantial research programs in agriculture, medicine and nutrition, the social sciences, the physical and biological sciences, engineering, and the humanities. In addition to these projects aided by outside sponsors, there is a large amount of unsponsored research by departments and individual staff members supported by the University itself as a continuing part of the normal professional activity of its members. The office of the Vice President for Research works closely with the Graduate faculty in supporting research programs which

properly advance the education and training of graduate students, including industrially sponsored fellowships.

## RESEARCH CENTERS

### SOCIAL SCIENCE RESEARCH CENTER

The Center is an organization designed to encourage and facilitate research in all major fields of the social sciences on a voluntary basis. Its services are available for social science research by individual faculty members and organized staff groups in all schools and colleges of the University. Essentially decentralized in its operation, the Center's services include aid in the planning and development of studies, the soliciting of funds from foundations on behalf of individual projects, and direct financial support of limited proportions. With minor exceptions, the Center does not itself provide technical services or maintain a stand-by technical staff, but uses its offices to help channel inquiries to appropriate campus agencies and individuals.

Services to graduate students in the past have assumed varied forms. Inquiries concerning the services currently available should be addressed to the Center Office. Since the Center is a facilitating rather than an operating agency, graduate students should seek employment opportunities through their departments, where Center-financed or Center-associated projects may be located, rather than through the Center itself. The Center will be happy to provide information concerning the nature and sponsorship of these projects.

The Director of the Center is Professor William F. Whyte. The administrative office and work rooms of the Center are located in Goldwin Smith Hall.

### STATISTICS CENTER

The methods of statistics find important applications in many diverse fields of research. It is therefore necessary that (1) subject matter specialists be able to obtain assistance in using or developing statistical theory, (2) students who intend to do research in a particular field which makes extensive use of statistical methods receive adequate training in statistics, and (3) individuals be trained as statisticians.

The staff members of the various schools and colleges of Cornell University who are interested in the development and application of statistical methods are associated in the Cornell Statistics Center. A major responsibility of the Center is to provide a focal point to which individuals, projects, and departments may come to receive assistance and guidance with respect to the statistical aspects of research and training programs.

The Acting Director of the Center is Professor Philip J. McCarthy, Warren Hall.

### **HOUSING RESEARCH CENTER**

The purpose of the Housing Research Center is to aid and guide basic research in the field of housing, to facilitate graduate study, and to route housing information among colleges and departments and between the University and sources of information off campus. A small central staff facilitates the initiation and conduct of projects.

The facilities of the Housing Research Center are available to faculty members and graduate students in all fields. Through the Center, students who cut across traditional lines of research may draw upon the knowledge and experience of specialists in such various subject areas as design, materials, equipment, structural methods, environment, family living, economics and finance, government, and health.

The Director of the Center is Professor Glenn H. Beyer, Martha Van Rensselaer Hall Annex, and the Assistant Director is Professor Alexander Kira, Sibley Hall.

### **CENTER FOR AERIAL PHOTOGRAPHIC STUDIES**

Photographic interpretation has applications in the fields of agriculture, engineering, geology, and city and regional planning. The Center for Aerial Photographic Studies offers a broad program in various scientific fields for training personnel in aerial photographic interpretation. The objectives are, first, to train scientists who will be able to use aerial photographs for surveys and planning in fields where they are needed and, second, through research to extend the use of aerial photographs into all fields which can be benefited.

The Center comprises a staff of educators, scientists, and technicians experienced in research and the application of aerial photographs to their respective fields. The program consists of primary courses in engineering interpretation of aerial photographs, map reproduction, photogrammetry, cartography and map projections, together with specialized study in a particular field of the candidate's choice, such as agricultural development, national resource explorations, city planning, or engineering project planning.

For information about the Center, write to the Director, Center for Aerial Photographic Studies, Lincoln Hall.

### **NEW YORK STATE AGRICULTURAL EXPERIMENT STATION AT GENEVA**

The New York State Agricultural Experiment Station was established in 1880 to promote agriculture through scientific investigations and experimentation. It is located at Geneva, 50 miles from Ithaca, and has been under the administration of Cornell University since 1923.

Professors on the Geneva staff are eligible to serve as members of the special committees of graduate students along with professors on the Ithaca campus of the University. Normally the graduate training provided at Geneva consists of research experience and the supervision

of the student's work on a thesis problem. The formal course work part of the student's training program is given on the Ithaca campus.

The Station is equipped to care for graduate students in certain specific lines of research, viz., bacteriology, chemistry, economic entomology, food technology, plant pathology, pomology, seed investigations, and vegetable crops. Ample facilities are available for graduate research under laboratory, greenhouse, pilot plant, insectary, orchard, and other field conditions.

Certain phases of the investigations now being conducted at the Station and other problems for which the facilities of the Station are suitable may be used as thesis problems by graduate students.

The Director is Professor A. J. Heinicke, who may be addressed at the New York State Agricultural Experiment Station, Geneva, or at the Plant Science Building, Cornell University, Ithaca.

Students who plan to do part of their graduate work at Geneva should correspond with their major adviser or with the Dean of the Graduate School, concerning regulations as to residence, Special Committees, etc.

#### **CORNELL AERONAUTICAL LABORATORY**

The Laboratory, a separate corporation wholly owned by Cornell University, is in Buffalo, New York. Applied and fundamental research in the aeronautical sciences and allied areas is conducted in this very completely equipped laboratory under contracts mainly with the military services. Close relationships, both research and educational, are maintained with the campus in Ithaca.

#### **OTHER RESEARCH UNITS**

Some other research units allied with the University, either as wholly owned and operated divisions or as wholly or partially autonomous organizations with which the University has a working agreement, are the Sloan-Kettering Cancer Research Institute (in New York City, through the Graduate School of Medical Sciences), the Veterinary Virus Research Institute (at Ithaca), and the Brookhaven National Laboratory (Cornell is one of nine university trustees, under contract with the Atomic Energy Commission).

#### **THE UNIVERSITY LIBRARIES**

The University libraries comprise the central University Library, the Mann Library of Agriculture and Home Economics, the libraries of the following colleges and schools: Architecture, Business and Public Administration, Engineering, Hotel, Industrial and Labor Relations, Law, Medicine, and Veterinary; such special libraries as the Barnes Library in Anabel Taylor Hall (religion), the Goldwin Smith Library (liberal arts), and the libraries of the Cornell Aeronautical Laboratory

and the Geneva Experiment Station, as well as a group of special departmental libraries. The total holdings of the libraries exceed 2,000,000 items, and about 75,000 volumes are being added annually.

A new research library is now under construction. Scheduled for completion late in 1960, this building will have a shelving capacity of two million volumes and seats for nine hundred readers. In addition to the customary general library facilities, it will include a microtext reading room, a series of graduate study, conference, and typing rooms, one hundred private faculty studies, and over three hundred carrels for graduate students.

Two of the college libraries, Engineering and Veterinary, recently moved into spacious and attractive new quarters in Carpenter Hall and the main Veterinary College building respectively. Both of these libraries now contain ample space for the growth of their collections and convenient and comfortable accommodations for readers.

The libraries not only provide the reference and collateral reading materials necessary for the support and enrichment of teaching and research but also have extensive collections of rare books, newspapers, maps, documents, manuscripts, microfilms, and microcards. Especially enriched by the early acquisitions of Cornell's first president, Andrew D. White, and by the first librarian, Willard Fiske, the libraries possess special collections of rare books and manuscripts in many of the fields of graduate study, including unique collections relating to the French Revolution, witchcraft, Dante, Petrarch, China and Southeast Asia (Wason), Iceland, American historical documents (Noyes), Brazil, German literature and philology (Zarncke), Wordsworth, and Joyce. There is a separate rare book department with a curator in charge. The acquisitions and reference librarians work with graduate students to procure volumes needed for their special studies. Cubicles and other study rooms are available for the use of graduate students in the several libraries.

The Collection of Regional History and the Cornell University Archives constitute a manuscript depository which is expanding at the rate of half a million manuscripts a year. In 1959 the holdings totaled approximately thirteen million items. These manuscripts relate to all aspects of the economic, political, and social history of this region and areas connected historically with it, and to all aspects of the development of Cornell University. The curator and archivist attempts to acquire manuscripts for special projects of researchers.

## **PUBLICATION AND PHOTOGRAPHY**

Cornell University Press is the oldest university press in America and is among the leaders in number of volumes published annually. In addition to serving scholars and scientists of the University by pub-



lication of results of studies, the staff of the Press, in cooperation with the Graduate School, conducts colloquia on methods and problems of publishing, directed specifically to graduate students.

The extension services of the New York State Colleges, which form integral parts of the University, disseminate knowledge through an intensive program of publication, photography, and recording, supervised by professional staffs. Materials of graduate students may find an outlet through these channels.

The University owns and operates the Photo Science Laboratory, which is equipped to create or cooperate in the creation of photographic studies and visual aids of all kinds.

## **INTERDEPARTMENTAL PROGRAMS**

### **MEDIEVAL AND RENAISSANCE STUDIES**

The Interdepartmental Program of Medieval and Renaissance Studies is founded on the conviction that European civilization of the Middle Ages and Renaissance forms a comprehensive whole and that specialized subjects of inquiry within it are best studied in terms of that broader context—political, social, economic, literary, artistic, religious, scientific, and philosophic. The Program therefore especially encourages graduate programs which include subjects under more than one field and has the following aims:

1. To understand the character and development of medieval and Renaissance civilization as a whole;
2. To introduce the student to several of the disciplines relevant to serious study of medieval and Renaissance civilization;
3. To develop in the student competence in a single discipline and to launch him on his independent work.

Students in the Program are subject to the same regulations regarding Special Committees and major and minor subjects as other graduate students at the University. Since approval of various combinations of fields, subjects, and courses is left to the discretion of the Special Committees, it is possible to adjust programs to the individual needs and interests of students (see sections on Special Committees and Fields of Instruction).

The Interdepartmental Committee on Medieval and Renaissance Study administers the George Lincoln Burr Fellowship, which is open to candidates for the doctorate in the Program. The fellowship covers tuition and fees and has in addition a stipend of \$1900. There are a number of other fellowships and scholarships at Cornell University for which students in the Program (both Ph.D. and M.A. candidates) are eligible (see section on Fellowships).

For further information, address the Chairman, Interdepartmental Committee on Medieval and Renaissance Studies, Goldwin Smith Hall, Cornell University, Ithaca, New York.



### SOUTHEAST ASIA PROGRAM

The Southeast Asia Program possesses substantial facilities for study and research on the graduate level and provides exceptional opportunities for general or specialized work on all of Southeast Asia in various fields of the humanities, social sciences, and some natural sciences, as well as in interdisciplinary area courses or seminars. Much basic and pioneering research remains to be done in this area, and the Southeast Asia Program is well organized and equipped to help meet such needs.

Several Southeast Asia Fellowships and Research Assistantships are offered each year to graduate students undertaking work in the Southeast Asia Program. The fellowships carry stipends up to \$1500 plus tuition and University fees. Fellowships and assistantships are open only to qualified candidates for an advanced degree at Cornell. They may be Americans or Canadians, nationals of Southeastern Asian countries, or, in exceptional cases, nationals of other countries.

In all cases these awards will be made only to applicants who are able to demonstrate a serious scholarly interest in Southeast Asian studies; who show the greatest promise of becoming qualified Southeast Asian regional experts with specialization in a relevant discipline of the humanities, social sciences, or certain natural sciences; and who are admitted to the Cornell Graduate School for advanced work in such a discipline. Previous experience in Southeast Asia or in the study of that area is not necessarily required. It is important that the applicant be able to show that advanced work in a major subject offered at Cornell combined with work in the Southeast Asia Program will make his future professional activities more effective; and this requirement is particularly important for a student in the natural sciences. Fellowships are offered only for study in residence at Cornell and cannot be held while the student is in the field. Appointments are made for one academic year only. Reappointment is subject to reapplication and review.

The primary purpose of these awards is to encourage graduate students to acquire a substantial knowledge of Southeast Asia while majoring in one of the discipline fields of the Graduate School. Accordingly they are offered only to students who, while working in such a field, take a minor in Far Eastern Studies and participate fully in the Southeast Asia Program. The recipient of a fellowship may be asked to devote up to six hours each week under faculty supervision to work connected with the Program. Research assistants devote twenty hours each week under faculty direction to research work on Southeast Asia, and, accordingly, receive only three-quarters residence credit.

Additional information and application forms for Southeast Asian fellowships and assistantships may be obtained by writing to the Director, Southeast Asia Program, Morrill Hall, Cornell University, Ithaca, New York. Students in the Program may also apply for assistantships, fellowships, or scholarships offered by other departments of Cornell University.

## FIELDS OF INSTRUCTION

**T**HE FIELDS OF INSTRUCTION in the Graduate School are listed alphabetically below under the following four Areas: Humanities, Social Sciences, Biological Sciences, and Physical Sciences. For each of the *fields* there are listed the respective faculties, approved major and minor subjects, language requirements for the Master's degree (if any), and special requirements or policies of the *field*.

### FIELDS

In most instances the *field* coincides with a department in a college or school. In parentheses immediately following the name of the *field* is given an abbreviation indicating the Announcement of a school or college which contains descriptions of courses and seminars offered, as follows: *Ag.*, New York State College of Agriculture; *Arch.*, College of Architecture; *Arts*, College of Arts and Sciences; *Ed.*, School of Education; *Engin.*, College of Engineering; *H.E.*, New York State College of Home Economics; *Hotel*, School of Hotel Administration; *I.L.R.*, New York State School of Industrial and Labor Relations; *Vet.*, New York State Veterinary College. For registration and preregistration of courses, see p. 18.

### MAJOR AND MINOR SUBJECTS

For each *field* there is given an approved list of titles from which candidates for advanced general degrees choose major and minor subjects. The numbers 1, 2, 3, 4, 5 have the following meaning:

- 1, approved as major subject for the Ph.D.
- 2, approved as major subject for the Master's degree.
- 3, approved as minor subject when the major is in the same *field*.
- 4, approved as minor subject when the major is in another *field*.
- 5, approved as a minor subject for the Master's degree only.

For explanation regarding *language requirements* for the Master's degree, see p. 17.

### REPRESENTATIVES

Since instruction in the Graduate School is primarily individual, those interested in becoming students are encouraged to communicate with individual members of the faculty with whom they may want to

study. Personal interviews in advance of formal application for admission are especially encouraged. For the benefit of those who are not acquainted with appropriate members in the *field* or *fields* of their choice, each *field* has selected a *representative* to whom inquiries may be addressed. The *representatives* are designated in the lists of faculty below by *italics*.

In corresponding with a field representative, please indicate, in addition to the name of the *representative*, the title, *Field Representative*, on the envelope address, as the field representatives often rotate on a yearly basis.

## HUMANITIES

### ARCHITECTURE (*ARCH.*)

*Faculty:* S. M. Barnette, L. D. Brown, T. H. Canfield, A. H. Detweiler, H. Elder, J. Q. Hejduk, M. W. Perreault, C. Rowe, F. M. Wells.

#### APPROVED MAJOR AND MINOR SUBJECT

History of Architecture 4

### ART (*ARCH.*)

*Faculty:* A. C. Atwell, V. Colby, N. D. Daly, K. Evett, J. M. Hanson, J. A. Hartell, H. P. Kahn, J. O. Mahoney, J. L. Squier.

#### APPROVED MAJOR AND MINOR SUBJECTS

Painting 4

Sculpture 4

### HISTORY OF ART AND ARCHAEOLOGY (*ARTS*)

*Faculty:* D. L. Finlayson, N. A. Pattillo, A. R. Solomon, F. O. Waage.

#### APPROVED MAJOR AND MINOR SUBJECTS

Archaeology 2, 3, 4

History of Art 2, 3, 4

*Language requirement for Master's degree, proficiency in one: French, German, Italian.*

Graduate work is offered in the general field of the history of the visual arts (architecture, painting, sculpture, and the minor arts). Instruction is offered through advanced undergraduate courses and through independent study and research under individual direction.

The same conditions will usually apply in the election of work in the general field of archaeology as a major subject; however, relevant courses in such subjects as cultural anthropology may be substituted for some of those in art history, and for graduate work in classical archaeology courses in Latin and Greek may be so substituted.

A half-time assistantship is available. Prospective students interested in applying for this should write directly to the Department of Fine Arts, Goldwin Smith Hall.

### CHINESE LITERATURE (*ARTS*)

(See FAR EASTERN STUDIES)

## CITY AND REGIONAL PLANNING (ARCH.)

*Faculty:* G. H. Beyer, F. W. Edmondson, R. D. Katz, T. W. Mackesey, K. C. Parsons, J. W. Reys.

### APPROVED MAJOR AND MINOR SUBJECTS

City Planning 1, 3, 4

Regional Planning 1, 3, 4

Major study for candidates for the degree of Ph.D. is limited to those who hold the degree of Master of Regional Planning or its equivalent.

## THE CLASSICS (ARTS)

*Faculty:* Harry Caplan, James Hutton, G. M. Kirkwood, Friedrich Solmsen, F. O. Waage.

### APPROVED MAJOR AND MINOR SUBJECTS

Latin 1, 2, 3, 4

Greek 1, 2, 3, 4

Medieval and Renaissance Latin

Classical Archaeology 2, 3, 4

Literature 1, 2, 3, 4

Classical Rhetoric in Original or

Ancient History (see p. 63)

Translation 3, 4

Comparative Indo-European

Ancient Thought 3, 4

Linguistics 3, 4

*Language requirement for Master's degree, proficiency in one: French or German, to be demonstrated at least one term before the degree is awarded.*

Admission to graduate study in a subject included in the Field of the Classics, except in archaeology, assumes a knowledge of the field selected equivalent in general to that expected of a student who has pursued the subject concerned throughout four years of undergraduate study in a college of recognized standing.

Graduate work in the classics is conducted in the main by the seminar system, the object of which is training in the methods, the principles, and the performance of independent research and criticism, and the work is therefore as far as possible put into the hands of the students themselves. A seminar room in the University Library building is reserved for the exclusive use of graduate students in the classics.

For fellowships in Greek and Latin, see page 29. The income of the Charles Edwin Bennett Fund for Research in the Classical Languages is used each year in the way best suited to promote the object for which the fund was established.

Doctoral dissertations of an appropriate nature will be accepted for publication in the *Cornell Studies in Classical Philology*.

## COMPARATIVE LITERATURE (ARTS)

*Faculty:* M. G. Bishop, E. A. Blackall, H. Caplan, A. Caputi, J.-J. Demorest, E. G. Fogel, J. S. Hannesson, J. Hutton, W. R. Keast, G. M. Kirkwood, R. Langbaum, J. A. Mazzeo, G. A. McCalmon, I. Rabinowitz, H. E. Shadick, F. Solmsen, H. A. Wichelns.

### APPROVED MAJOR SUBJECT

Comparative Literature 1

No Master's degree is offered in Comparative Literature. Candidates who wish to pursue work for the Ph.D. in Comparative Literature are advised to take a regular M.A. in the national literature which interests them most. A candidate's work for the M.A., if concerned with a modern literature, should involve some study of medieval Greek or Latin literature. Each candidate's two minor subjects are to involve *two* national literatures, other than that of his major subject for the M.A.,



and are to be chosen from among the subjects already approved as minor subjects under the various literary fields. There is only one restriction: no candidate may include *both* English and American literature among his subjects for the Ph.D.

Candidates for the Ph.D. with a major in Comparative Literature are expected to demonstrate an adequate reading knowledge of Latin or Greek.

## ENGLISH LANGUAGE AND LITERATURE (ARTS)

*Faculty:* M. H. Abrams, R. M. Adams, A. J. Caputi, G. F. Cronkhite, R. A. Donovan, R. M. Durling, C. R. Edwards, R. H. Elias, Ruth Fisher, J. P. Feil, E. G. Fogel, W. H. French, R. A. Greenberg, B. L. Hathaway, G. H. Healey, W. R. Keast, L. Lane, R. W. Langbaum, J. R. McConkey, J. A. Mazzeo, F. E. Mineka, A. M. Mizener, D. Novarr, S. M. Parrish, J. L. Rosier, W. M. Sale, J. Senior, W. J. Slatoff, S. E. Whicher.

### APPROVED MAJOR AND MINOR SUBJECTS

Medieval Literature 1, 2, 3, 4	American Literature 1, 2, 3, 4
Old and Middle English 1, 2, 3, 4	English Poetry 1, 2, 3, 4
The English Renaissance to 1660 1, 2, 3, 4	Dramatic Literature 1, 2, 3, 4
The Restoration and the Eighteenth Century 1, 2, 3, 4	Prose Fiction 1, 2, 3, 4
The Nineteenth Century and After 1, 2, 3, 4	Folk-Literature 3, 4
	Creative Writing 2, 3, 4
	Bibliography 3, 4 *

*Language requirement for Master's degree, proficiency in one: Greek, Latin, French, German, Italian. Candidates failing to demonstrate proficiency on admission will be required to complete two residence units following passing of the examination, unless an exception is made by the field.*

In general, at least thirty-six hours of college English will be required of all applicants; but college work of good quality in allied literatures will sometimes be considered the equivalent of work in English. Training in the Greek and Latin languages and literatures is especially acceptable; and some allowance may be made for advanced work in philosophy or history. Applicants who have taken the Graduate Record Examination (Aptitude and Advanced Tests) should include a transcript of the results; others may submit the usual required papers and will be notified if the Department believes that scores on the Examination may affect their chances of acceptance. Because of many requests for work in English and the necessity of preserving a high ratio of teachers to graduate students, the Department may have to limit or defer the admission of applicants for study in certain areas.

A Master's candidate in the regular sessions will complete eight one-term courses, at least four of them numbered 500 or above in the *Announcement of the College of Arts and Sciences*. In these, he will be expected to read scholarly writing in a foreign language, and to maintain a high standard in the quantity and quality of his work. Ordinarily the thesis will be a suitable adaptation of a paper produced in connection with the course work.

Candidates for the Master's Degree who expect to complete their work entirely in summer sessions will not be held for the requirements stated above, but will follow another procedure. Members of the staff will direct their study, but ordinarily cannot undertake to supervise Summer Research or other projects for students not registered in the summer sessions.

\*Study and projects completed in this minor may not replace or include any parts of Course 500 or the requirements for the major, other minor, or thesis.



Before receiving the degree, candidates for the Doctorate must demonstrate a knowledge of Old English, both the language and the literature. They will be sent information regarding other details of their study.

In addition to receiving its share of the fellowships made available by the Graduate School, the Department controls the award of the Martin Sampson and the Class of 1916 Fellowships, and appoints a number of candidates for advanced degrees to part-time teaching positions. Address inquiries about teaching positions to Chairman of Department of English, Goldwin Smith Hall, Ithaca, New York. Address inquiries relating purely to graduate work to Field Representative, Department of English, Goldwin Smith Hall, Ithaca, New York.

## GERMAN (ARTS)

*Faculty:* E. A. Blackall, A. Bonawitz, A. G. de Capua, H. L. Kufner, W. G. Moulton, B. E. Pike.

### APPROVED MAJOR AND MINOR SUBJECTS

German Literature 1, 2, 3, 4

Germanic Linguistics 1, 2, 3, 4

*Language requirement for the Master's degree: proficiency in French as soon as possible and no later than the beginning of the second semester of residence.*

In the advanced courses in this field the work is twofold: literary and linguistic. The history of German literature from the earliest period to the present day is treated in lecture courses with collateral reading. Special topics are selected for detailed study in the Seminar on Germanic Linguistics and the Seminar in German Literature. The courses offered in Germanic linguistics include the study of Gothic, Old Saxon, and Old and Middle High German; they also afford an introduction to the methods of descriptive, historical, and comparative linguistics as applied to Germanic languages, dialectology and the history of the German language from earliest times. The course on Bibliography and Method aims to impart the principles and methods of investigation and a knowledge of the bibliographical resources.

Candidates for the Ph.D. with a major in German Literature must select Germanic Linguistics as one of their minors; candidates for the Ph.D. with a major in Germanic Linguistics must select German Literature as one of their minors. Candidates for advanced degrees in German are expected to have an adequate knowledge of French and Latin, and must pass the Graduate Reading Examination in French as one of the languages offered.

## MUSIC (ARTS)

*Faculty:* W. W. Austin, W. A. Campbell, D. R. Eller, D. J. Grout, K. Husa, J. Kirkpatrick, R. M. Palmer, T. A. Sokol.

### APPROVED MAJOR AND MINOR SUBJECTS

Musical Composition 2, 3, 4

Musicology 1, 2, 3, 4

Theory of Music 2, 3, 4

*Language requirement for Master's degree: for majors in musicology, proficiency in French and German; for majors in composition or theory, proficiency in French or German. Proficiency must be met immediately upon admission to candidacy.*

Candidates are expected to take active interest in musical performance. All candidates are tested for musical proficiency: singing and playing unfamiliar music at sight, score reading, and fluency at the keyboard; on the basis of these tests, students may be advised to enroll in undergraduate courses or to undertake extracurricular work in musical practice and theory. Choral and orchestral organizations of the

University and the community welcome graduate students and their wives or husbands as members.

Normally students whose major subject is theory or composition choose musicology as a minor subject, and vice versa. Doctoral candidates choose a second minor subject in a related field. It is especially important for doctoral candidates to equip themselves with a good reading knowledge of both French and German as early as possible.

A large microfilm collection of Renaissance music and music theory is available to qualified candidates working in this field.

## **SUSAN LINN SAGE SCHOOL OF PHILOSOPHY (ARTS)**

*Faculty:* Max Black, S. M. Brown, Jr., E. A. Burt, K. S. Donnellan, R. G. Henson, Norman Malcolm, Thomas E. Patton, John Rawls, David Sachs, F. N. Sibley, H. R. Smart.

The Susan Linn Sage School of Philosophy was founded through the generosity of the late Henry W. Sage, who endowed the Susan Linn Sage Professorship and gave in addition \$200,000 to provide permanently for instruction and research in philosophy.

*The Philosophical Review*, supported by the University and managed by the Sage School, is an international quarterly that publishes articles, reviews, and discussions in all branches of philosophy.

### **APPROVED MAJOR AND MINOR SUBJECTS**

Aesthetics 1, 2, 3, 4	Metaphysics 1, 2, 3, 4
Epistemology 1, 2, 3, 4	Philosophy 4
Ethics 1, 2, 3, 4	Philosophy of Religion 1, 2, 3, 4
History of Philosophy 1, 2, 3, 4	Philosophy of Science 1, 2, 3, 4
Logic 1, 2, 3, 4	Political Philosophy 3, 4

*Language requirement for Master's degree: proficiency in French or German immediately upon admission to candidacy.*

The instruction offered to graduate students presupposes such undergraduate courses in the subject as would be taken by a student in the College of Arts and Sciences of Cornell University who had elected philosophy as a major subject. Those who have not had equivalent preparation are expected to make up their deficiencies outside the work required for an advanced degree.

The Sage School provides opportunity for advanced study to two classes of graduate students: (1) those whose major interest is in some branch of philosophy; (2) those whose chief branch of research is in allied fields but who desire to supplement this with a minor in philosophy.

1. Students whose major interest is in philosophy are required (a) to gain a general knowledge of the whole subject including its history, and (b) to select some aspect or subdivision of it for intensive study and research.

2. Graduate students having a major interest in literature or the arts, in history or social studies, or in mathematics or a branch of experimental science, are permitted to choose a minor in philosophy with such emphasis as best suits their needs. For such students the School endeavors to outline a plan of philosophical study (in courses or directed reading) which will form a natural supplement to their field of research.

The aim of the department in graduate work is to devote its resources primarily to the instruction of students who expect to proceed to the Ph.D. in philosophy. It is not the normal policy of the department to accept as graduate students those who

have no intention of pursuing academic work beyond the M.A. degree. However, the department will be prepared to accept as M.A. candidates those students who expect to continue advanced studies later, either in philosophy or in some other field, and those who, while not expecting to pursue graduate work beyond the M.A., nevertheless give satisfactory evidence of a serious interest in philosophy.

### ROMANCE STUDIES (ARTS)

*Faculty:* F. B. Agard, M. G. Bishop, Dalai Brenes, J. J. Demorest, R. A. Hall, Jr., L. C. Porter, B. L. Rideout, Alain Seznec.

#### APPROVED MAJOR AND MINOR SUBJECTS

French Linguistics 1, 2, 3, 4	Romance Linguistics 1, 2, 3, 4
French Literature 1, 2, 3, 4	Spanish Linguistics 1, 2, 3, 4
Italian Literature 1, 2, 3, 4	Spanish Literature 1, 2, 3, 4
Italian Linguistics 1, 2, 3, 4	

A working knowledge of Latin is especially desirable for all candidates for advanced degrees in this field. All candidates for the degree of Doctor of Philosophy must satisfy the language requirement in French and German before beginning to earn the fourth residence unit. A graduate student in Romance Studies should have completed some formal study in the language and in the literature of the language which he intends to select as his major subject and should have adequate preparation for advanced work in his minor subjects.

### RUSSIAN (ARTS)

*Faculty:* G. H. Fairbanks, R. L. Leed, Vladimir Nobokov

#### APPROVED MAJOR AND MINOR SUBJECTS

Russian Literature 1, 2, 3, 4	Slavic Linguistics 1, 2, 3, 4
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Course offerings in Slavic linguistics include Old Bulgarian and Old Russian; they also include courses in descriptive, historical, and comparative methods of analysis applied to the Slavic languages. Candidates for advanced degrees with a major in Slavic linguistics should have a reading knowledge of both French and German; candidates for the Ph.D. with a major in Slavic linguistics are expected to develop proficiency in a second Slavic language.

### SPEECH AND DRAMA (ARTS)

*Faculty:* H. D. Albright, C. C. Arnold, Harry Caplan, Joseph Golden, G. A. McCalmont, E. C. Nuttall, W. H. Stainton, H. A. Wichelns, J. F. Wilson.

#### APPROVED MAJOR AND MINOR SUBJECTS

<i>Division of Rhetoric and Public Address:</i>	Dramatic Production 2, 3, 4
Rhetoric and Public Address 1, 2, 3, 4	Playwriting 2, 3, 4
Principles of Public Address 3, 4	<i>Division of Speech Pathology and Phonetics:</i>
Classical and Medieval Rhetoric 3, 4	Speech and Phonetics 1, 2, 3, 4
<i>Division of Dramatic Production:</i>	See also General Linguistics
Drama and the Theatre 1	(Arts)

The chief aim of graduate work in speech and drama is to develop competent investigators and teachers. In many cases, the work will require more than the minimum periods of residence. Ordinarily, residence in this University during at least two academic years will be necessary for the doctorate.

Applicants for graduate study in the Field of Speech and Drama must take the Graduate Record Examination Aptitude Test in sufficient time to permit consideration of the results along with the application for admission to the Graduate School.

Candidates for the Master's degree in the Division of Dramatic Production are required to complete at least one academic year and one summer session in residence.

Candidates for the Doctor's degree in the Division of Rhetoric and Public Address will usually choose one minor subject from the field of literary history and criticism or from that of the social sciences. Substitution of Latin or Greek for one of the modern languages may be requested.

In the Division of Dramatic Production candidates for the Doctor's degree will be required to take dramatic literature as a minor subject, unless they have already pursued systematic study in this subject. If preparing for general teaching, candidates will be advised to take additional courses in rhetoric and public address and in speech and phonetics. Candidates for the doctorate in this Division must expect to be in residence two years and one summer beyond the requirements for the Master's degree.

Students in the Division of Dramatic Production will be expected to avail themselves of the opportunities for theatre practice afforded by various branches of the Cornell University Theatre.

A fuller description of the graduate programs in Speech and Drama may be obtained by writing to the Field Representative, Department of Speech and Drama.

## SOCIAL SCIENCES

### AGRICULTURAL ECONOMICS (AG.)

*Faculty:* R. D. Aplin, C. A. Bratton, M. E. Brunk, K. S. Carpenter, H. E. Conklin, L. C. Cunningham, L. B. Darrah, Herrell DeGraff, B. A. Dominick, W. G. Earle, V. B. Hart, G. W. Hedlund, R. B. How, T. N. Hurd, C. D. Kearl, M. S. Kendrick, C. W. Loomis, E. A. Lutz, J. W. Mellor, J. F. Metz, K. L. Robinson, R. S. Smith, Leland Spencer, B. F. Stanton, R. P. Story, S. W. Warren.

#### APPROVED MAJOR AND MINOR SUBJECTS

Agricultural Economics 4	Marketing and Business Management
Agricultural Policy and Economic Development 1, 2, 3, 4	1, 2, 3, 4
Farm Management 1, 2, 3, 4	Public Administration and Finance
Prices and Statistics 1, 2, 3, 4	1, 2, 3, 4

Students majoring in this field should consult the description in this Announcement of the Fields of Business and Public Administration, Economics, and Industrial and Labor Relations for other subjects related to the work in this field.

A broad knowledge of the physical and biological aspects of agriculture is valuable background for graduate work in the Field of Agricultural Economics. Undergraduate training should include the basic sciences as well as courses in the production, handling, and processing of farm products. (An undergraduate major in Agricultural Economics is not required for graduate work in this field.) Firsthand experience in farming is desirable.

Candidates for the Doctor's degree in addition to selecting a major may also select a minor from the above list of approved major and minor subjects but should choose a second minor from among subjects offered elsewhere in the University.

The field offers opportunities for study and research in the following specialized branches: farm management, farm finance, marketing, prices, statistics, business management, public administration and finance, agricultural land economics, agri-

cultural geography, agricultural development, and agricultural policy. Students have the opportunity and are encouraged to take courses in related fields such as economics, statistics, and mathematics.

The Department has excellent facilities for study and research. Offices are supplied for graduate students and laboratories equipped with modern calculating machines are available.

Assistantships are available that provide an opportunity for part-time employment in teaching, research, or extension. Assistants normally conduct their thesis research as part of their assistantship duties in connection with departmentally financed projects.

The field does not require a foreign language for the degree of Master of Science.

## **ANTHROPOLOGY (ARTS)**

*Faculty:* J. Adair (Medical College), C. F. Hockett, A. R. Holmberg, C. C. Hughes, A. H. Leighton, M. E. Opler, J. M. Roberts, L. Sharp, R. J. Smith.

### **APPROVED MAJOR AND MINOR SUBJECT**

Anthropology 1, 2, 4

*Language requirement for the Master's degree: proficiency in one language acceptable to the Special Committee.*

Excellent opportunities are offered for graduate study and research in all phases of cultural anthropology, in archaeology (see also Art and Archaeology), in linguistics (see also General Linguistics), and in comparative social psychology and social psychiatry. Staff members are particularly qualified by research experience to supervise graduate work on the native cultures and applied anthropology of Africa; North, Middle, and South America; East, Southeast, and South Asia; Oceania; and the circumpolar regions. Supplementary work may also be pursued in special interdisciplinary area and language programs on China, Southeast Asia, and India (see Far Eastern Studies) and in Latin American studies. Graduate training in anthropology is closely related to work in sociology (see Sociology). Exceptional facilities are available for the study of a variety of Latin American, North American Indian, Oceanic, and Asian languages (the last including Sanskrit and Pali). Work in cultural, social, and personality theory and methods of research is offered not only by the staff in anthropology, but also in related fields as well (see Child Development and Family Relationships, History, Industrial and Labor Relations, Psychology, Rural Sociology, Sociology).

Staff members have supervised a number of major field research projects; graduate students may participate directly in these or utilize resulting field data for purposes of training and research. The current research program includes work in comparative socialization, social psychiatry in Africa and northeastern North America, and problems in general ethnology, cultural change, and applied anthropology in Japan, Southeast Asia, India, the Andean region, and among the Apache, Navaho, Zuni, Eskimo, and Australian aborigines. The University libraries provide outstanding general resources in all languages for graduate study and research in anthropology, including unique special collections relating to witchcraft, early North American history, Brazil, China, and Southeast Asia. The White Art Museum houses working collections of anthropological materials. The University is a charter member of the Human Relations Area Files, Inc. The Social Science Research Center, the Statistics Center, and the special area programs facilitate studies in anthropology.

Applicants for admission in anthropology should have a general background in the humanities, social studies, and human biology; an undergraduate major in the subject is desirable but is not required. Applicants are urged to present Graduate



Record Examination scores: Several research and teaching assistantships are awarded each year, usually to advanced graduate students. Also available to candidates in anthropology with special interests in Asia and Latin America are fellowships offered by area programs and research projects.

## BUSINESS AND PUBLIC ADMINISTRATION

*Faculty:* F. T. Bent, H. Bierman, E. Brooks, G. C. Chow, E. Dale, M. G. de Chazeau, F. F. Gilmore, J. E. Hampton, A. M. Hillhouse, R. S. Holmes, J. G. B. Hutchins, F. LeRocker, A. E. Nilsson, R. V. Presthus, J. M. Rathmell, L. S. Reed, M. I. Roemer, M. Shain, W. H. Shannon, C. S. Sheppard, S. Smidt, D. A. Thomas, P. P. Van Riper, J. H. Walters, P. Wasserman, R. F. White.

### APPROVED MAJOR AND MINOR SUBJECTS

The Administrative Process 1, 3, 4

Finance and Accounting 1, 3, 4

Supply, Production, and Distribution 1, 3, 4

Managerial Economics and Politics 1, 3, 4

Students majoring in this field should consult the description in this Announcement of the Fields of Agricultural Economics, Economics, and Industrial and Labor Relations for other subjects related to the work in this field.

The professional degrees of Master of Business Administration and Master of Public Administration are awarded by action of the faculty of the Graduate School of Business and Public Administration under conditions imposed by that faculty, and the prospective candidate should consult the *Announcement of the Graduate School of Business and Public Administration*.

The Ph.D. program in the Field of Business and Public Administration is aimed at providing an advanced and comprehensive education in administration, public and private, primarily for men who seek careers in teaching or research in this professional field. However, through this program a student may also prepare for many types of positions in business and governmental administration in which advanced training, if not always an absolute requirement, is highly desirable.

Candidates for the Ph.D. degree proposing to major in Business and Public Administration must select a major subject from among those listed above. One of the student's minor subjects may also be selected from this list. However, it is the policy of the Field of Business and Public Administration to encourage the student to select his second minor from among related subjects outside this field. Ph.D. candidates with majors in fields other than Business and Public Administration, but who wish to minor in this field, may also choose from among the above four subjects. Minors at the Master's level are not encouraged except in unusual cases. Though the requirements for a minor are somewhat less rigorous and advanced than for a major, minors at either the Master's or doctoral level presume a suitable foundation for advanced work.

Brief descriptions of the scope and method of the subjects in the Field of Business and Public Administration are outlined below:

**THE ADMINISTRATIVE PROCESS.** This subject embraces all aspects of the art and science of administering organizations, involving such administrative matters as internal organization and structure, administrative behavior, coordination and control, communications, personnel and human relations, planning, policy formulation, and program development. It will normally require the study of both private and public administration, and, in some cases, of foreign administration as well.

**FINANCE AND ACCOUNTING.** This subject concerns those aspects of administration which are subject to monetary measurement and analysis. It includes accounting,



with its body of doctrine and its professional literature, together with financial analyses of all types, ranging from those found in private investment activities to those involved in the operations of public treasurers and budget directors.

**SUPPLY, PRODUCTION, AND DISTRIBUTION.** This subject embraces another large and interrelated group of management functions found in both private and public administration. It includes work in marketing and market research, production and procurement, and, to some extent, traffic management.

**MANAGERIAL ECONOMICS AND POLITICS.** This subject emphasizes the selection and analysis of economic and political data and relationships as a guide to decision-making and policy formulation, and involves interdisciplinary work in economics, political science, and administration. In some cases, it may involve substantial work in quantitative analysis as well. The student may approach this subject either through the comprehensive and intensive study of economic, political, and administrative factors and interrelationships associated with particular industries or public agencies (interpreting "industry" and "agency" broadly), or, from an over-all point of view, through the study of various types of problems and relationships which may be recurrent through a number of industries and public agencies, or through the administrative structure of a particular country or society. For example, students may approach this subject (1) through study of the transportation industry, of the problems in city management, etc., or (2) through study of some over-all problem such as competitive behavior, economic instability, etc.

Admission to the Ph.D. program in Business and Public Administration generally presumes academic work in administration or related social science fields at the Master's level. Ordinarily the candidate is expected to have a Master's degree, but this is not an absolute requirement.

A number of fellowships and scholarships are made available each year for candidates for the Ph.D. degree in Business and Public Administration (see Fellowships and Scholarships, p. 30). Prospective students interested in teaching or research assistantships should make their inquiries direct to the Field Representative, Graduate School of Business and Public Administration, McGraw Hall.

## **CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS (H.E.)**

*Faculty:* A. L. Baldwin, H. Bayer, W. L. Brittain, U. Bronfenbrenner, R. H. Dalton, E. C. Devereux, Jr., H. Feldman, M. E. Ford, J. Harding, H. Levin, K. M. Reeves, H. Ricciuti, M. Straus.

### **APPROVED MAJOR AND MINOR SUBJECTS**

Child Development and Family	Child Development 3, 4
Relationships 1, 2, 3, 4	Family Relationships 3, 4

Admission to graduate work is based primarily on the evidence of the student's competence to do advanced work and on broad preparation as a basis for specialization. Opportunities to acquire background in the behavioral sciences are available, and the graduate student with relatively little preparation in the behavioral sciences should plan on additional time for the completion of the degree.

The department has a number of research projects in which students may participate. A series of research *practica* has been instituted in conjunction with, but not as a part of, on-going research projects for the purpose of training the student in the formulation of problems, the development of research design, and the analysis and interpretation of data.

Approximately 15 teaching and research assistantships are available. Application should be made directly to the Department of Child Development and Family Relationships.

Since the subject matter in child development and family relationships draws on several disciplines, students are encouraged to supplement their work with studies in related fields. For courses in these related fields, see the Announcements of the Colleges of Agriculture, Arts and Sciences, Home Economics, the Schools of Industrial and Labor Relations and of Education.

## CITY AND REGIONAL PLANNING (ARCH.)

(See page 51.)

## ECONOMICS (ARTS)

*Faculty:* G. P. Adams, Jr., M. G. Clark, M. A. Copeland, M. G. de Chazeau, D. F. Dowd, F. H. Golay, J. G. B. Hutchins, A. E. Kahn, M. S. Kendrick, Ta-Chung Liu, R. E. Montgomery, Chandler Morse, P. M. O'Leary, E. J. Rice.

### APPROVED MAJOR AND MINOR SUBJECTS

Econometrics and Economic Statistics	International Economics and the Economics of Development
1, 2, 3, 4	1, 2, 3, 4
Economic History	Labor Economics
1, 2, 3, 4	1, 2, 3, 4
Economic Theory and its History	Monetary, Financial, and Fiscal Economics
1, 2, 3, 4	1, 2, 3, 4
Industrial Organization and Control	
1, 2, 3, 4	

Students majoring in this field should consult the description in this Announcement of the Fields of Agricultural Economics, Business and Public Administration, and Industrial and Labor Relations for other subjects related to the work in Economics.

*Language requirement for Master's degree: proficiency in an approved foreign language must be established before taking the final examination.*

1. All candidates resident in the United States during the year preceding matriculation at Cornell must take the Graduate Record Examination.

2. All candidates for the degree of Ph.D. with a major in economics will be required to demonstrate competence in two subsidiary subjects and in economic statistics and accounting in addition to their major and two minors. The major, minor, and subsidiary subjects must include economic theory and its history.

3. All candidates for advanced degrees who elect a minor in economics will be held for work in economic theory.

4. Candidates for advanced degrees with a major in economics are encouraged to elect one minor subject in another field.

5. Applications for fellowships and scholarships in economics should be filed with the Dean of the Graduate School prior to the deadline date (see Calendar). Applications for teaching assistantships, however, should be made directly to the Chairman of the Department of Economics.

## ECONOMICS OF THE HOUSEHOLD AND HOUSEHOLD MANAGEMENT (H.E.)

*Faculty:* G. J. Bymers, A. J. Davey, M. M. Knoll, M. A. Rollins, Rose Steidl, Kathryn Walker, Jean Warren, L. J. Williamson.

### APPROVED MAJOR AND MINOR SUBJECTS

Economics of the Household and Household Management	1, 2, 4
Economics of the Household	2, 3, 4
Home Economics (General)	5
	Household Management 2, 3, 4

Students selecting a major in economics of the household and household management are expected to take courses in both phases of the field; for the degree of Ph.D. the minor subjects are usually selected to support one phase or the other. Appropriate minor subjects may be chosen from a variety of fields including other branches of home economics, agricultural economics, economics, education, psychology, sociology, and industrial and labor relations.

As a background for graduate work in this field, a well-rounded undergraduate program in home economics is preferable, in general, to specialization. Undergraduate courses in mathematics, statistics, economics, history, anthropology, sociology, psychology, physics, chemistry, physiology, and bacteriology are also useful.

## EDUCATION AND RURAL EDUCATION (ED.)

*Faculty:* J. S. Ahmann, H. G. Andrus, J. P. Bail, A. L. Baldwin, Sara Blackwell, Ralph Campbell, H. R. Cushman, R. H. Ennis, Jean Failing, J. M. Fenley, R. B. Fischer, F. F. Foltman, F. S. Freeman, B. Gaylord, M. D. Glock, C. W. Hill, L. B. Hixon, P. G. Johnson, C. L. Kulp, J. P. Leagans, D. J. McCarty, Helen Moser, A. G. Nelson, Helen Y. Nelson, Irene Patterson, Walter Pauk, Isabel Peard, Katherine Reeves, Kathleen Rhodes, V. N. Rockcastle, W. A. Smith, F. H. Stutz, F. K. T. Tom, Helen Wardeberg, A. L. Winsor; Deans Frank Baldwin and Dorothy V. N. Brooks.

### APPROVED MAJOR AND MINOR SUBJECTS

Agricultural Education 1, 2, 3, 4,	History and Theory of Education
Education 3, 4	1, 2, 3, 4
Educational Administration and	Home Economics Education 1, 2, 4
Supervision 1, 2, 3, 4	Development of Human Resources
Educational Psychology and	1, 2, 3, 4
Measurement 1, 2, 3, 4	Nature, Science and Conservation
Elementary Education 1, 2, 3, 4	Education 1, 2, 3, 4
Extension and Adult Education 1, 2, 3, 4	Secondary Education and
Guidance and Personnel Administration	Curriculum 1, 2, 3, 4
1, 2, 3, 4	

Students in education may be admitted to candidacy for two types of advanced degrees: (1) the general degrees, M.A., M.S., or Ph.D., or (2) the professional degrees, M.Ed., or Ed.D. Requirements for (2) and a listing and description of courses in this field are to be found in the *Announcement of the School of Education*.

The requirements for admission to candidacy for the general degrees are the same as those for the professional degrees. In the Field of Education there is no foreign language requirement for Masters' degrees unless stipulated by the candidate's Special Committee.

## FAR EASTERN STUDIES (ARTS)

*Faculty:* Knight Biggerstaff, J. M. Echols, F. H. Golay, C. F. Hockett, R. B. Jones, G. McT. Kahin, T. C. Liu, M. E. Opler, Harold Shadick, Lauriston Sharp, R. J. Smith, Martie Young.

### APPROVED MAJOR AND MINOR SUBJECTS

Chinese Literature 1, 2, 3, 4	Far Eastern Studies 3, 4
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*Language requirement for the Master's degree: proficiency in French, German, or Japanese by the beginning of the second semester of residence.*

Requirements for the Doctor's degree with a major in Chinese literature: (1) familiarity with representative works in classical and vernacular Chinese; (2) broad knowledge of the available translations of Chinese literature and critical studies in

Western languages; (3) specialized knowledge of at least two subfields such as the Confucian or Taoist classics, poetry, drama, fiction, classical prose, or twentieth-century writings.

The requirements for the M.A. degree or for a minor in Chinese literature are roughly equivalent to (1) and (2) above.

The requirements for the minor in Far Eastern Studies include a detailed knowledge of China or Southeast Asia or India and a general acquaintance with one other of these areas.

The department administers special interdisciplinary area programs on China, India, and Southeast Asia. These are fully described in the *Announcement of the Department of Far Eastern Studies*, obtainable from the department, Franklin Hall. Graduate students in the China program may major in Far Eastern history (see History) or in Chinese literature; or they may minor in these fields or in Far Eastern Studies, with the major in another field. Graduate students in the Southeast Asia program may major in Southeast Asian History or minor in Far Eastern Studies with the major in another field.

Several assistantships are available for which application should be made directly to the Department of Far Eastern Studies. A number of special fellowships are available to students in the China and Southeast Asia programs; see Fellowships and Scholarships, p. 27.

The Cornell University Library includes unique European-language collections on China, India, and Southeast Asia, and good working collections of books and periodicals in Chinese, Indonesian, and Thai.

## GENERAL LINGUISTICS (ARTS)

*Faculty:* F. B. Agard, A. Bonawitz, J. M. Cowan, J. M. Echols, G. H. Fairbanks, W. H. French, R. A. Hall, Jr., C. F. Hockett, R. B. Jones, Jr., H. L. Kufner, R. L. Leed, W. G. Moulton, L. C. Porter, D. F. Solá.

## APPROVED MAJOR AND MINOR SUBJECT

General Linguistics 1, 2, 3, 4

The following more specialized linguistic subjects, listed elsewhere, are also available: Speech and Phonetics (see Speech and Drama); Latin language, Greek language (see the Classics); Old and Middle English (see English Language and Literature); Germanic linguistics (see German); French, Spanish, and Romance linguistics (see Romance Studies); and Slavic linguistics (see Russian). In any of these, emphasis is laid on (1) methodology, and (2) the body of results already attained in the subject; in general linguistics the primary emphasis is on (1), and in the linguistics of a specified language or group of languages the primary emphasis is on (2).

Other special research interests of the staff members, in which formal or informal course work can be arranged upon demand, are: pidginized and creolized languages; dialectology and linguistic geography, especially in the American-English, Dutch, French, German, and Italian areas; comparative Indo-European; classical and modern Armenian; Pali and Old Persian; American Indian languages; language and culture; information theory; Burmese, Chinese, Indonesian, Thai, and Vietnamese.

Candidates for the M.A. with a major in general linguistics are required to have a reading knowledge of either French or German. Candidates for the Ph.D. with a major in general linguistics are required to have a reading knowledge of both French and German and to elect cultural anthropology as one of their minors.

The Cornell Linguistics Club, open to all interested, meets biweekly throughout the school year and affords an opportunity for the presentation and discussion of current developments in linguistics.

**GEOGRAPHY (ARTS)**

(See page 96.)

**GOVERNMENT (ARTS)**

*Faculty:* W. F. Berns, Jr., W. H. Briggs, A. T. Dotson, M. Einaudi, A. Hacker, G. McT. Kahin, T. Lowi, S. Muller, C. Rossiter, J. F. Triska.

**APPROVED MAJOR AND MINOR SUBJECTS**

American Government and Institutions	International Relations 1, 2, 3, 4
1, 2, 3, 4	The Political Process 1, 2, 3, 4
Comparative Government 1, 2, 3, 4	Political Theory 1, 2, 3, 4
Constitutional Law 1, 2, 3, 4	Public Administration 1, 2, 3, 4
International Law and Organization	
1, 2, 3, 4	

For graduate work in government a candidate should have a general knowledge of political science, history, sociology, economics, and international affairs. It is recommended that candidates for the Ph.D. with major study in government should take at least one minor outside the field.

In addition to the qualifying and final examinations, candidates for the Ph.D. with a major in government will be required to pass a comprehensive written examination prior to the completion of four terms of residence and before commencing work on the thesis. This examination shall comprise American government and institutions, political theory, and three additional subjects to be selected by the candidate: either (1) from the approved major and minor subjects listed by the field, or (2) where minor subjects are taken outside the field, from such minors as may be required by the professor in charge.

The attention of students desiring to do graduate work in public law is directed to opportunities open to them in the Law School. Members of the faculty of the Law School may serve as members of Special Committees where appropriate arrangements have been made.

**HISTORY (ARTS)**

*Faculty:* Knight Biggerstaff, D. B. Davis, E. W. Fox, P. W. Gates, Henry Guerlac, W. F. LaFeber, F. G. Marcham, C. P. Nettels, E. F. Rice, Jr., W. M. Simon, Marc Szeftel, and Brian Tierney.

**APPROVED MAJOR AND MINOR SUBJECTS**

American History 1, 2, 3, 4	History of Science 1, 2, 3, 4
Ancient History 1, 2, 3, 4	Medieval History 1, 2, 3, 4
Modern Chinese History 1, 2, 3, 4	Early Modern European History 1, 2, 3, 4
English History 1, 2, 3, 4	Slavic History 1, 2, 3, 4
European History since 1789, 1, 2, 3, 4	Southeast Asian History 1, 2

The language requirement for the Master's degree is proficiency in French, German, or Russian. Another foreign language may be substituted if, in the judgment of the candidate's Special Committee, the relative amount, quality and pertinence of source materials and scholarly writing in the candidate's approved major subject are superior in that language to the one for which it is substituted.

Proficiency in the chosen language must be demonstrated on entrance. Candidates who are not proficient on entrance will be allowed to pursue their graduate study at the rate of half of the residence credit they would otherwise earn so long as they are making up the deficiency in their language preparation and until they demonstrate proficiency.



*In the case of candidates for whom the M.A. will be the terminal degree and who do not need the language for research, the Department of History will entertain petitions for waiving the language requirement.*

With respect to language substitution for Ph.D. candidates, see p. 17. Candidates for the Ph.D. in Chinese or Southeast Asian History must have a reading knowledge of the appropriate Far Eastern language. Substitution of the Far Eastern language for one of the required languages may be requested. Candidates for the Ph.D. in Slavic History must have a reading knowledge of Russian. Candidates for the Ph.D. in Ancient History must read both Greek and Latin in addition to French and German, and in Medieval History must read Latin in addition to two of the approved languages.

Proficiency in one foreign language must be demonstrated on entrance. (See pp. 16-17 of this Announcement.)

Candidates majoring in History may take minors in other history subjects or in other fields of the Graduate School.

In addition to several fellowships (see p. 30), a number of assistantships are available. Prospective students interested in applying for assistantships should write directly to the Chairman, Department of History, West Sibley Hall.

## **HOME ECONOMICS, GENERAL (H.E.)**

*Faculty:* See Child Development and Family Relationships, Economics of the Household and Household Management, Food and Nutrition, Home Economics Education, Housing and Design, Institution Management, Textiles and Clothing. *John S. Harding*, Chairman, Home Economics Graduate Faculty.

### **APPROVED MINOR SUBJECT**

General Home Economics 5

For students who wish the minor to give breadth of contact with the field of home economics rather than depth in one area. Courses to be selected from the offerings in several of the areas of home economics.

## **HOME ECONOMICS EDUCATION (H.E., ED.)**

*Faculty:* S. Blackwell, H. Moser, H. Nelson, I. Patterson and K. Rhodes.

### **APPROVED MAJOR AND MINOR SUBJECTS**

Home Economics Education 1, 2, 4,

General Home Economics 5 (see Home Economics, General)

Graduate students may have a major or a minor in Home Economics Education during candidacy for any one of the following degrees:

Degree degrees—Master of Science, Doctor of Philosophy.

Professional degrees—Master of Education, Doctor of Education.

(See *Announcement of the School of Education* for requirements for professional degrees.)

A candidate for an advanced degree with a major or minor in Home Economics Education is expected to have an undergraduate major in home economics and some courses in education. Experience in teaching is desirable as a basis for graduate work and may be accepted in some cases in lieu of undergraduate courses in education.

Graduate students prepare for positions in many phases of Home Economics Education, such as adult education, extension teaching, secondary school teaching, college teaching, administration and supervision of home economics programs,



and research in home economics education. Students may observe and participate in home economics programs at all age levels through the schools, the College of Home Economics, the Extension Service, and other agencies.

Candidates for advanced degrees with a major in Home Economics Education are expected to acquire a general knowledge of (1) the history and philosophies of education; (2) principles of (a) curriculum development, (b) educational psychology, (c) teaching methods, (d) evaluation, and (e) research methods in education.

Departmental research projects provide opportunities for students to gain experience in research procedures and may yield data for theses of Masters' or doctoral candidates. Projects in progress during 1960-1962 include (a) identifying factors related to the effectiveness of high school homemaking programs, (b) a study of problems in programs of Home Economics for adults, and (c) factors related to the college teaching of Home Economics.

## **HOTEL ADMINISTRATION (*HOTEL*)**

*Faculty:* R. A. Beck, C. E. Cladel, M. H. Ericson, G. W. Lattin, H. B. Meek, F. H. Randolph, H. J. Recknagel, C. I. Sayles, T. W. Silk, J. J. Wanderstock.

### **APPROVED MAJOR AND MINOR SUBJECTS**

Hotel Administration 1, 2, 4

Hotel Accounting 2, 3, 4

Graduate work in the Field of Hotel Administration is open to those *who have completed in full the requirements for the undergraduate degree in the School of Hotel Administration and to them only.*

Students who hold Bachelors' degrees in the liberal arts or in general business administration who wish a program in hotel administration normally enroll in the undergraduate division. They may become candidates for an additional Bachelor's degree or at their choice simply enroll for a specialized program of hotel administration courses suited to their particular needs.

## **HOUSING AND DESIGN (*H.E.*)**

*Faculty:* J. Adler, G. H. Beyer, L. L. Bower, H. J. Cady, G. C. Millican, S. Neblett, V. True.

### **APPROVED MAJOR AND MINOR SUBJECT**

Housing and Design 1, 2, 3, 4

*Language requirement for the Master's degree: college entrance language, or proficiency before beginning of second residence unit.*

For the degree of M.S. with a major in housing and design, the work may be focused in housing or in design. The student should have a general knowledge of basic concepts of the particular area (or branch of the area) in the Field of Housing and Design in which he proposes to major.

The program for the degree of M.S. varies for each phase of study. Flexibility in programing cares for varying backgrounds and objectives of students. A major must obtain comprehensive knowledge of one of the subjects of this field. The student is required to fill in gaps in his background where they apply in such areas as social science, fine arts, statistics, and research methods. Such a student may need to spend additional time at Cornell. The candidate should choose a minor in a related field.

A major in the Field of Housing and Design leading to the Ph.D. degree is offered. The emphasis is on the socio-economic and family aspects of housing.

For work toward the doctorate with a major in housing and design the student

must expand his knowledge beyond the specialized subject in which he focused for work toward the Master's degree. Professional experience is desirable. Two minors are selected from fields related to housing and design.

Members of the staff will direct work in the following subject matter areas: *Design*: Professors Adler, Cady, Millican, Neblett, True; *Socio-economic Aspects of Housing and General Housing Research*: Professors Beyer and Bower.

## INDUSTRIAL AND LABOR RELATIONS (I.L.R.)

*Faculty*: L. P. Adams, R. L. Aronson, I. Blumen, T. Burling, R. N. Campbell, J. T. Carpenter, M. P. Catherwood, M. G. Clark, A. H. Cook, R. Corvini, D. E. Cullen, R. H. Ferguson, F. F. Foltman, K. L. Hanslowe, C. A. Hanson, W. L. Hodges, V. H. Jensen, M. R. Konvitz, H. A. Landsberger, A. H. Leighton, D. M. MacIntyre, P. J. McCarthy, J. W. McConnell, J. T. McKelvey, E. Mesics, F. I. Miller, J. G. Miller, R. E. Montgomery, J. O. Morris, M. F. Neufeld, R. L. Raimon, R. F. Risley, A. W. Smith, N. A. Tolles, H. M. Trice, W. F. Whyte, B. F. Willcox, J. P. Windmuller.

### APPROVED MAJOR AND MINOR SUBJECTS

Collective Bargaining, Labor Law, and Labor Movements 1, 2, 3, 4  
 Economic and Social Statistics 1, 2, 3, 4  
 Human Resources and Administration 1, 2, 3, 4  
 Labor Economics and Income Security 1, 2, 3, 4  
 Industrial and Labor Relations Problems 4  
 International and Comparative Labor Relations 3, 4

Students majoring in this field should consult the description in this Announcement of the Fields of Agricultural Economics, Business and Public Administration, and Economics for other subjects related to the work in this field.

*Language requirement for Master's degree: proficiency in one language approved by the Special Committee before beginning the second residence unit.*

A description of the program leading to the degree of Master of Industrial and Labor Relations, which is designed to provide broad coverage and some specialization, is found in the *Announcement of the School of Industrial and Labor Relations*.

For both the M.S. and Ph.D. degrees emphasis is placed upon independent study and research. The following are minimum requirements prerequisite to the independent investigations required in the major or minor subjects:

**COLLECTIVE BARGAINING, LABOR LAW, AND LABOR MOVEMENTS.** For a Ph.D. major, the candidate must show proficiency in the following areas of knowledge: (1) history of the labor movement and collective bargaining in the United States; (2) history of unionism and labor relations in major industries; (3) theories of trade unionism and collective bargaining; (4) structure, government, administration, and activities of the labor movement and of major national unions; (5) structures, procedures, practices and major issues in collective bargaining; (6) federal and state legislation and leading cases in labor relations law; (7) role of government in labor relations, with emphasis on the methods and implications of different forms of dispute settlement; (8) history and problems of labor movements and labor relations in other countries; (9) bibliography and major sources of information in collective bargaining and trade unionism.

For a Ph.D. minor, (1), (3), (4), (5), (6), and (7) are required.

For an M.S. major, (1), (4), (5), (6), and (7) are required.

For an M.S. minor, (1), (4), and (5) are required.

**ECONOMIC AND SOCIAL STATISTICS.** For a major in this subject the candidate must show (1) good command of the principles of statistical reasoning; (2) proficiency in

the use of statistical methods and in the processing of statistical data; (3) qualified skill in the application of proper statistical tools of analysis to a specific topic in economics or social studies, including a thorough knowledge of statistical sources; (4) knowledge of differential and integral calculus.

For a minor, (1), (2), (3) are required, the level being less advanced than for a major.

**HUMAN RESOURCES AND ADMINISTRATION.** For a major in this subject the candidate must demonstrate:

1. Knowledge of the fields basic in individual and social behavior and of concepts of administration and supervision.
2. Special competence in one of three areas of study, as follows:

*A. Human Relations*

(1) The principal human relations problems commonly found in industrial and labor relations and the bearing of these problems on other fields such as collective bargaining, labor organization, management organization, economics and law; (2) the problems involved in the relationship between industries and communities; (3) resources generally available in educational techniques and community services that have bearing on human relations problems; (4) theories of human organization.

*B. Development of Human Resources*

(1) Social, economic, and political factors which influence the value and scope of educational and training activities conducted for the development of manual, technical, and managerial personnel; (2) the philosophy, controlling purpose, and organizational setting characteristic of development programs in industry, academic institutions, labor organizations, governmental agencies, private trade associations, and consulting services; (3) organizational behavior and administrative practices which assist or hinder the growth and development of the individual; (4) understanding of organization, techniques, and operations of activities utilized in the development of manual, technical, and managerial personnel.

*C. Personnel Management*

(1) Understanding of the nature and scope of the personnel function and the social, economic, and political factors which influence its development; (2) knowledge of the organization of the personnel function and the techniques, methods, and procedures utilized in carrying on the personnel activities of an organization; (3) knowledge of industrial and labor legislation and regulatory functions of government as related to the personnel function; (4) understanding of basic factors affecting the relationships between individuals and groups within an organization and between organizations.

3. Ability to isolate issues worthy of research, to identify and locate relevant studies or other sources of information, and independently to develop and conduct additional research.

For a minor 1 and 3 and either 2-A (1) and (4), or 2-B (1) and (2), or 2-C (1) and (2).

**INDUSTRIAL AND LABOR RELATIONS PROBLEMS.** (Offered as a minor only to graduate students in fields of study other than industrial and labor relations.)

A candidate for an advanced degree must have a general understanding of the subject matter in the Field of Industrial and Labor Relations. In order to prepare for a minor in this field, the candidate will normally complete three to five courses in accordance with a program approved by his Special Committee.

**INTERNATIONAL AND COMPARATIVE LABOR PROBLEMS.** (Available only as a minor subject.)

This subject of study is concerned with (1) the development and current role of

labor movements in countries in various stages of industrialization with special reference to ideological, economic, political, and social factors influencing the history, policies, and activities of labor organizations; (2) the development and current state of industrial management, with emphasis on its recruitment, training, utilization, and on ownership patterns; (3) similarities and diversities in systems of labor-management relations at different stages of economic development; (4) labor market, wage policy, and economic security problems, especially in countries undergoing rapid economic change; and (5) the development and programs of national and international organizations (ILO, ICFTU, WFTU, ITS, U.S. government agencies, trade unions, and management) having special competence and interests in international labor questions.

In addition to attaining, through comparative techniques and other methods, a basic knowledge of (1), (2), (3), (4), and (5), students electing a minor in International and Comparative Labor Problems are expected to acquire a thorough knowledge of labor problems and labor-management relations in *one* specific country or area other than the United States.

**LABOR ECONOMICS AND INCOME SECURITY.** This field of study involves analysis of the labor force, labor markets, wages and related terms of employment, income distribution, unemployment, health and safety in industry, superannuation, and private programs and legislation designed to meet income and employment problems.

For a major in this field, the candidate must demonstrate (1) comprehensive knowledge of historical developments and current issues in the area of employment and income; (2) skill in analysis of economic, political, social, and administrative problems in this field; (3) knowledge of the significant legislation dealing with income, employment, and employee welfare; (4) detailed acquaintance with the literature and sources of information in the field; (5) familiarity with income and employment problems and related legislation in selected foreign countries.

For a minor, (2) and (3) are required.

Applicants must include in their credentials the results of the Graduate Record Examination (Aptitude Test). If, for satisfactory reasons, a person cannot take the examination before he wishes his application considered, the admissions committee may act provisionally pending submission of scores at a later date.

Applicants may be interviewed in Ithaca (and occasionally elsewhere) by members of the Graduate Committee of the field and by other faculty members representing subjects in which the candidate proposes to study. Inquiries concerning interviews should be directed to the Secretary of the Graduate Committee, New York State School of Industrial and Labor Relations.

Applications for graduate assistantships to begin in September should be received not later than February 15; for February, not later than November 15. Write to the Secretary of the Graduate Committee for application material.

The Carnegie Corporation of New York has granted funds for two-year fellowships in industrial psychiatry, which provide an opportunity for trained psychiatrists to study at the New York State School of Industrial and Labor Relations and to apply psychiatric knowledge and methods to the problems of industry in actual plant situations. Applicants must hold an M.D. degree and have completed a minimum of two years of approved training in psychiatry.

Note, also, the fellowships of the Field of Industrial and Labor Relations and the special tuition scholarships, p. 31.

## INSTITUTION MANAGEMENT (H.E.)

*Faculty:* Mary Bloetjes, Alice Burgoin, Kathleen Cutlar, Karla Longrée, Aimee Moore.

**APPROVED MAJOR AND MINOR SUBJECT**

Institution Management 2, 4

A strong background of undergraduate courses in food and nutrition and the supporting physical and biological sciences and a well-balanced program in other branches of home economics are expected. Undergraduate courses in institution management and some experience in managerial dietetics or commercial food service administration are desirable.

Graduate work leading to the Master's degree may emphasize either the administrative or the more technical aspects of institution management. There is no prescribed program of study for either the major or the minor in this field. It is expected that the program will supplement the student's previous training and experience to achieve a well-rounded knowledge of the subject, with due consideration given to the student's purpose in undertaking graduate study.

Related minors are in other branches of home economics, particularly food and/or nutrition, or in such subjects as personnel administration, agricultural marketing, hotel accounting, and education.

Members of the staff will direct work in institution administration and management and in experimental quantity cookery.

The department offers opportunities for experimentation in the research kitchen, and the cafeteria. Several graduate assistantships are available.

**LAW**

*Faculty:* H. W. Briggs, M. H. Cardozo, W. D. Curtiss, W. T. Dean, W. H. Farnham, H. A. Freeman, K. Hanslowe, H. G. Henn, M. R. Konvitz, J. W. MacDonald, I. R. MacNeil, L. W. Morse, R. S. Pasley, N. Penney, R. B. Schlesinger, W. H. Shannon, J. T. Sneed, G. Thoron, P. Ward, E. N. Warren, B. F. Willcox.

**APPROVED MINOR SUBJECT**

Law 4

**RURAL SOCIOLOGY (AG.)**

*Faculty:* F. D. Alexander, W. A. Anderson, R. A. Danley, G. J. Cummings, B. L. Ellenbogen, O. F. Larson, L. Nelson, R. A. Polson, C. E. Ramsey, W. W. Reeder, E. F. Sharp, P. Taietz, H. E. Thomas, R. M. Williams, Jr.

**APPROVED MAJOR AND MINOR SUBJECTS**

Rural Sociology 1, 2, 4

Organization Methods and Community Development 2, 3, 4

Methods in Social Research 2, 3, 4

Some of the occupations which graduates in rural sociology most frequently enter are college teaching and research in rural sociology; extension work in rural sociology; community development and extension work in foreign cultures and in underdeveloped areas; social research work with government and private organizations; and consultation in organization methods and community development. Many foreign students find this training fits their needs as they prepare for similar activities in their own countries.

Several teaching and research assistantships are available. Application should be made directly to the Department of Rural Sociology.

Research assistants and some other graduate students have the opportunity to participate in planning and carrying out the Department's research programs under the supervision of project leaders. Some of the projects currently active are: social change in rural areas; the rural-urban fringe; migratory farm labor problems; pro-



gram planning procedures; old age and retirement; population trends; experiments in community development; the sociology of health; social participation; recruitment for professional services in rural areas; and part-time and low income farmers.

Supervised field experience in organization methods and community development is also being instituted for mature, interested students. Those interested in some of the applications of research have an opportunity to observe and participate in the Department of Rural Sociology projects in extension work and in studies designed to test extension methods.

A student offering *Rural Sociology* as a *major for the Ph.D. degree* is expected to acquire a thorough knowledge of: (a) sociological theory and its history; (b) the methodology of sociological research; (c) rural sociology and the research in this field; and (d) organization methods and community development.

When *Rural Sociology* is offered as a *major for the M.S. degree* or as a *minor for the Ph.D. degree*, the candidate is expected to acquire a general knowledge of sociological theory, (b), (c), and (d) listed above.

When *Organization Methods and Community Development* is offered as a *major for the M.S. degree* or as a *minor for the Ph.D. degree*, the candidate is expected to acquire a thorough knowledge of organization methods and community development and a general knowledge of sociological theory, (b), and (c), listed above.

When *Methods in Social Research* is offered as a *major for the M.S. degree* or as a *minor for the Ph.D. degree*, the candidate is expected to acquire a thorough knowledge of the methodology of sociological research and a general knowledge of (a), (c), and (d) listed above.

When *Methods in Social Research* is offered as a minor for the Ph.D. degree, the candidate is expected to acquire a thorough knowledge of the methodology of research employed in his major field and in his second minor field.

Majors for the Ph.D. degree are required to take one minor outside the Field of Rural Sociology and in most cases will be encouraged to take both minors outside the major field.

In general, for an M.S. major in the Field of Rural Sociology, the minor should be selected outside the field.

While any minor is possible, such minors as general sociology, social psychology, anthropology, family relationships, guidance and personnel administration, extension education, agricultural economics, statistics, and mathematics are among those most closely related and most frequently chosen.

The various college Announcements, which describe courses, should be consulted. Of interest to Rural Sociology majors and minors will be the offerings of the Departments of Sociology and Anthropology and of Psychology in the College of Arts and Sciences; of the Departments of Rural Education and Agricultural Economics in the College of Agriculture; of the Department of Child Development and Family Relationships in the College of Home Economics; of the School of Industrial and Labor Relations; of the Graduate School of Business and Public Administration; and of the College of Architecture. Students interested in the Far East will wish to consult the *Announcement of the Department of Far Eastern Studies*, obtainable from that Department in Morrill Hall.

## SOCIOLOGY (ARTS)

*Faculty:* E. F. Borgatta, W. Delany, R. K. Goldsen, N. Kaplan, W. W. Lambert, J. W. McConnell, L. Meltzer, G. F. Streib, J. M. Stycos, W. E. Thompson, W. F. Whyte, R. M. Williams, Jr.

## APPROVED MAJOR AND MINOR SUBJECTS

Sociology 1, 2, 3, 4

Social Psychology 1, 2, 3, 4

Cultural Anthropology 2, 3, 4

Statistics 2, 3, 4



*Language requirement for the Master's degree: proficiency in one language acceptable to the Special Committee.*

For graduate work in these fields a student should have a general background in human biology, the social sciences, and the humanities. He should also have some knowledge of the basic concepts and applications of social statistics, although deficiencies in this respect can be made up in the course of his work as a graduate student.

There are several assistantships which are normally awarded to advanced graduate students. Applications should be made directly to the Field Representative, Department of Sociology, Morrill Hall.

The department sponsors various social research programs and field projects in which graduate students may participate directly for purposes of training or research. Research activities of the staff have included studies in intergroup relations, values, demography, sociology of science, role conflict, organizational behavior, social gerontology, small groups, sociology of health and medicine, and political sociology. Many of the research programs are carried on under the auspices of the Cornell Social Science Research Center, which is described in the section on Research Centers.

The requirements for the Doctor's degree are listed below. The requirements for the M.A. or M.S. degrees correspond generally to the minor requirements for the Doctor's degree.

**SOCIOLOGY.** When offered as a major: (1) a thorough knowledge of the field of sociological theory and its history; (2) a thorough knowledge of the methodology of sociological research; and (3) a detailed knowledge of at least three subfields in sociology from among the following: American society, the family, formal organization and bureaucracy, intergroup relations, political sociology, public opinion or communication,\* small groups,\* social movements, sociology of religion, stratification, urban sociology, and demography.

When offered as a minor: a general knowledge of part (1) of the above requirement and a satisfactory knowledge of one or two subfields.

**SOCIAL PSYCHOLOGY.** When offered as a major: (1) a thorough knowledge of social psychological theory and research, with emphasis upon current developments; (2) a thorough knowledge of the methodology of social psychological research; (3) a working knowledge of three of the following areas, and some familiarity with the remaining areas: experimental psychology, child development and family relations, personality, social processes and social change, social organization and social institutions, group dynamics, human relations in industry; and (4) detailed knowledge of some specialized aspect of social psychology to be selected by the student.

When offered as a minor: a general knowledge of parts (1) and (2) of the above requirements, and some familiarity with three of the following areas: experimental psychology, personality, social processes and social change, and group dynamics. Minor students should have a working knowledge of whichever aspects of social psychology are relevant to their Ph.D. dissertation topic.

Graduate training in social psychology is carried on in close relation to advanced instruction in the fields of anthropology, psychology, and sociology.

**STATISTICS.** When offered as a minor for the Ph.D. degree: (1) completion of an approved sequence of courses; (2) completion of a research project which demonstrates that the candidate is able to select methods appropriate to the problems and to employ advanced statistical methods.

During the period from July to September, members of the staff will not ordinarily advise candidates or supervise Summer Research.

\*Permitted only for students not offering social psychology as a minor.

The prospective student is advised to consult the Announcements describing offerings of the following departments for information about other instruction and research in the Field of Sociology: Departments of Psychology and of Far Eastern Studies in the College of Arts and Sciences; Department of Rural Sociology in the College of Agriculture; Department of Child Development and Family Relationships in the College of Home Economics; School of Industrial and Labor Relations, and Graduate School of Business and Public Administration.

### **STATISTICS (AG., ARTS, ENGIN., I.L.R.)**

*Faculty:* I. Blumen, R. Bechhofer, W. T. Federer, P. J. McCarthy, D. S. Robson, R. G. D. Steel, L. Weiss.

#### **APPROVED MAJOR SUBJECT**

Statistics 1, 2

*Language requirement for Master's degree: proficiency in French, German, or Russian or an approved substitute before completion of the second residence unit.*

The aim of graduate work in statistics is the training of individuals who will (1) have a thorough knowledge of the theoretical basis of modern statistical method and have demonstrated ability to make significant contributions to this theory, (2) have developed an understanding of the methods of scientific research in general and the role which statistics plays in this research, and (3) have had experience in aiding workers in various fields in the application of statistical method. For this reason, the minor subject or subjects must be taken with individuals outside the field, and one minor will ordinarily be in the Field of Mathematics. Students preparing for graduate work in statistics are urged to obtain a thorough grounding in mathematics through advanced calculus since their program of study will be seriously delayed if this preparation is lacking. If their interest is primarily in mathematical statistics they should consult the section on the Field of Mathematics in this Announcement.

A student majoring in statistics must complete a graduate sequence of courses in mathematical statistics (offered in the Department of Mathematics) which has been approved by his committee. Other course work required of majors in statistics will be chosen from among offerings by the above listed members of the field in the Department of Plant Breeding (*Ag.*) and the Schools of Mechanical Engineering (*Engin.*) and Industrial and Labor Relations (*I.L.R.*). Provisions for minoring in statistics are given in the sections of this Announcement devoted to the Fields of Industrial and Labor Relations, Mathematics, Mechanical Engineering, and Plant Breeding. A brochure on statistics may be obtained by writing to the Cornell Statistics Center, Warren Hall.

### **TEXTILES AND CLOTHING (H.E.)**

*Faculty:* M. L. Brew, M. Humphrey, E. F. McMurry, M. S. Ryan, F. M. Spratt, E. E. Stout, M. V. White.

#### **APPROVED MAJOR AND MINOR SUBJECTS**

Textiles 2, 3, 4

Clothing 2, 3, 4

Textiles and Clothing 2, 3, 4

For students who wish to major or minor in the Field of Textiles and Clothing, a wide variety of offerings is available both as to course work and opportunities for independent study. No fixed curriculum is prescribed for majors or minors in the field. Each student's program is planned with and for her individually after consideration of her previous training, her present interests, and her plans for the future. She is encouraged to make use of the wide opportunities for study in other

fields and other colleges on campus as well as in this field. Deficiency in background courses is not necessarily a bar to admission, but it may increase the time needed to earn a degree.

Candidates for a Master's degree in the Field of Textiles and Clothing are expected to have or to acquire a general knowledge of all phases of the field and an understanding of research methods in textiles and clothing, and to concentrate in any one of the various branches of textiles and clothing.

Such facilities as a conditioning room, textile equipment, and a large collection of historical costumes are available for research. For further information concerning facilities, write to the Field Representative.

On-going research in textiles and psychology of clothing allows for student participation.

Students working toward a Doctor of Philosophy degree in allied fields may minor in textiles and clothing.

A limited number of assistantships are available in the department.

## BIOLOGICAL SCIENCES\*

### AGRICULTURAL ENGINEERING (AG.)

*Faculty:* L. L. Boyd, E. W. Foss, O. C. French, W. W. Gunkel, F. G. Lechner, G. Levine, E. D. Markwardt, W. F. Millier, G. E. Rehkugler, E. S. Shepardson, J. W. Spencer, C. W. Terry, C. N. Turner.

#### APPROVED MAJOR AND MINOR SUBJECTS

*Note:* If the major for the M.S. degree is in the subject of agricultural engineering, the minor should not be elected from the other four subjects; if the major for the Ph.D. degree is in the subject of agricultural engineering not more than one of the other four subjects may be elected for a minor.

Agricultural Engineering 1, 2, 3, 4	See also Civil Engineering, p. 91.
Farm Electrification 1, 3, 4	Electrical Engineering, p. 93.
Farm Structures 1, 3, 4	Engineering Mechanics &
Power and Machinery 1, 3, 4	Materials, p. 94.
Soil and Water Engineering 1, 3, 4	Mechanical Engineering, p. 97.

To be admitted as a candidate for an advanced degree in this field an applicant will be required to have completed the equivalent of a recognized agricultural engineering curriculum with a scholarship ranking in at least the upper half of his class. A knowledge of general agriculture is also essential. This requirement may be satisfied by adequate general farm work experience or formal courses such as botany, soils, field crops, animal husbandry, and farm management.

An applicant who is not able to meet the prerequisite requirements for candidacy for an advanced degree may arrange for a program of work as a noncandidate.

### AGRONOMY (AG.)

*Faculty:* M. Alexander, A. J. Baur, K. C. Beeson, R. Bradfield, N. C. Brady, M. G. Cline, J. E. Dawson, B. E. Dethier, S. N. Fertig, R. Feuer, G. R. Free, W. L. Griffith, H. B. Hartwig, W. K. Kennedy, H. A. Kerr, E. J. Kinbacker, R. E. Krenzin, D. J. Lathwell, E. R. Lemon, H. A. MacDonald, R. D. Miller, R. B. Musgrave, T. R. Nielsen, M. G. Peech, M. M. Schreiber, R. R. Seaney, E. L. Stone, P. J. Zwerman.

\*Under faculty listings for several of the biological Fields of Instruction some professors are listed *at Geneva*. This refers to the opportunities for research that are at the New York State Agricultural Experiment Station at Geneva (see page 43).

## 74 BIOLOGICAL SCIENCES

### APPROVED MAJOR AND MINOR SUBJECTS

Soils 1, 2, 3, 4

Field Crop Production 1, 2, 3, 4

Meteorology 1, 2, 3, 4

### SPECIAL INTERESTS OF THE FACULTY

#### SOILS:

1. Soil chemistry: Professors Peech, Dawson, Nielsen and Beeson
2. Soil physics: Professors Miller and Lemon
3. Soil microbiology: Professor Alexander
4. Soil fertility: Professors Bradfield, Brady and Lathwell
5. Soil morphology, genesis and cartography: Professors Cline, Baur and Feuer
6. Soil conservation: Professors Zwerman, Free and Kerr
7. Forest soils: Professor Stone
8. Organic soils: Professor Dawson

#### FIELD CROP PRODUCTION:

1. Forage crop production, management, and utilization: Professors Hartwig, MacDonald, Kennedy, Griffith and Seanev
2. Cereal crops and crop ecology: Professors Musgrave, Kinbacher and Krenzin
3. Weed Control: Professors Fertig and Schreiber

#### METEOROLOGY:

1. Agricultural meteorology and climatology: Professor Dethier
2. Micrometeorology and microclimatology: Professor Dethier

Prospective students are urged to correspond with the professor in the above lists whose interests are nearest their own a few months in advance of the time they expect to enter.

### POLICIES PECULIAR TO THE FIELD

Students preparing for graduate work in agronomy are urged to obtain a thorough knowledge of general physics, mathematics through calculus, analytical, organic, and physical chemistry, general botany, bacteriology, genetics, plant physiology, and geology. Opportunity will be afforded for further study of some of these subjects after entering the Graduate School, but a student deficient in two or more of these foundation courses cannot expect to receive a degree in the minimum time required for residence. Some practical farm experience with soil and crop management problems is also desirable. Opportunity to acquire additional experience will be afforded a limited number of students majoring in the field by summer employment on departmental projects.

Students must consult the professor in charge before registering for any course numbered above 100 (see Ag., Agronomy).

### ANIMAL BREEDING AND PHYSIOLOGY (AG.)

*Faculty:* S. A. Asdell, R. W. Bratton, J. H. Bruckner, R. K. Cole, R. H. Foote, W. Hansel, C. R. Henderson, F. B. Hutt, A. van Tienhoven.

### APPROVED MAJOR AND MINOR SUBJECTS

Animal Breeding 1, 2, 4

Animal Genetics 1, 2, 4

Animal Physiology 1, 2, 3, 4

*Language requirement for the Master's degree: proficiency in French or German is required by Professors Cole, Hutt, and van Tienhoven. The other professors in this field usually require one language for the Master's degree if the student expects to become a candidate for the Ph.D.*

Before entering graduate study in animal breeding, the student should have had courses in zoology, general biology, comparative anatomy, physiology, and chemistry, and elementary courses in genetics and animal breeding. Some practical experience in animal husbandry, poultry husbandry, or plant breeding is desirable.

In the course of their graduate study, students will be expected to take certain courses in animal physiology, biochemistry, embryology, cytology, genetics, biometry, and histology. One or more of these may be selected as a minor subject.

Graduate studies in animal breeding may be taken in several departments of the University, and the student should consult the course offerings of each of these departments.

Work in genetics and breeding of large animals, including physiology of reproduction, is offered in the Department of Animal Husbandry under the supervision of Professors Asdell, Bratton, Foote, Hansel, and Henderson.

Graduate study in animal genetics is offered in the Field of Poultry Husbandry, where work in that field is supervised by Professors Hutt, Cole, and Bruckner.

Work in animal physiology is supervised by Professor van Tienhoven of the same field.

## ANIMAL HUSBANDRY (AG.)

*Faculty:* S. A. Asdell, H. J. Bearden, W. F. Brannon, R. W. Bratton, H. W. Carter, C. M. Chance, R. H. Foote, W. Hansel, C. R. Henderson, D. E. Hogue, J. K. Loosli, C. M. McCay, J. I. Miller, E. A. Pierce, W. G. Pond, J. T. Reid, G. H. Schmidt, S. T. Slack, S. E. Smith, J. R. Stouffer, G. W. Trimberger, K. L. Turk, R. G. Warner, G. H. Wellington.

### APPROVED MAJOR AND MINOR SUBJECTS

Animal Husbandry 1, 2, 3, 4

Animal Breeding 1, 2, 3, 4

Animal Nutrition 1, 2, 3, 4

Dairy Husbandry 1, 2, 3, 4

*Note:* If the major for the Ph.D. lies in one of these subjects, not more than one of the other three should be selected for a minor.

Although there are no foreign language requirements for the Master's degree, foreign language is recommended for those candidates who expect to go on for the Ph.D.

To enter graduate study in any of the subject matter fields in animal husbandry, the student should have the equivalent of the following courses: elementary feeds and feeding, animal breeding, and the various production courses in dairy and beef cattle, sheep, and swine. Also, the student should have basic courses in biology or zoology, bacteriology, chemistry, organic chemistry, mathematics, physics, animal physiology, and genetics.

In addition to the graduate courses in animal husbandry, candidates for the degrees of M.S. and Ph.D. will be expected to take advanced courses in chemistry, biochemistry, physiology, genetics, biological statistics, and other related fields.

## ANIMAL NUTRITION (AG.)

*Faculty:* L. L. Barnes, R. H. Barnes, F. W. Hill, D. E. Hogue, J. K. Loosli, C. M. McCay, M. C. Nesheim, W. G. Pond, J. T. Reid, M. L. Scott, S. E. Smith, R. G. Warner.

### APPROVED MAJOR AND MINOR SUBJECT

Animal Nutrition 1, 2, 4

To enter upon graduate study with animal nutrition as a major subject, the student should have preparation in general biology or zoology, mathematics,

introductory chemistry, analytical chemistry, organic chemistry, physics, human or animal physiology, and animal breeding or genetics. Some preparation or experience in livestock or poultry production is desirable but not required.

In the course of preparation for an advanced degree, candidates, according to their special interests, may acquire training in nutrition, biochemistry, physiology, pathology, food technology, histology, calculus, statistics, and other fields of science and technology. Students are generally advised to select either biochemistry or physiology as minor fields of study for the Master's degree and both of these subjects as minor fields for the doctorate. However, other minor fields of study such as those listed above may be selected, depending upon the student's interest. Physical chemistry and advanced work in organic chemistry may be required of students particularly interested in the biochemistry of nutrition.

A strong research program in animal nutrition is maintained at Cornell University under the direction of members of the faculty responsible for the training of graduate students in this field. Students are frequently able to broaden their research training and experience by participating in some of the animal nutrition projects of the Experiment Station. As a research problem for the degree, students are permitted to select, if they desire, various phases of established projects which permit them to exercise originality and independence of thinking.

If they do not already possess a reading knowledge of German and French, students expecting to continue their graduate studies should prepare to meet the language requirement for the doctorate during the course of their preparation for the Master's degree.

Students in nutrition may be admitted to candidacy for the general degrees (M.S. or Ph.D.) as described above, or the professional degree, Master of Nutritional Science (M.N.S.). A listing and description of courses in the M.N.S. program are to be found in the *Announcement of the Graduate School of Nutrition*.

## BACTERIOLOGY (AG.)

*Faculty:* E. A. Delwiche, R. F. Holland, G. Knaysi, R. E. MacDonald, H. B. Naylor, H. W. Seeley, Jr., P. J. Vandermark. *At Geneva:* A. W. Hofer, G. J. Hucker, C. S. Pederson, D. F. Splittstesser, K. H. Steinkraus.

### APPROVED MAJOR AND MINOR SUBJECTS

Bacteriology 1, 2, 4

(See also Pathogenic Bacteriology  
1, 2, 3, 4, p. 86)

*Language requirement for Master's degree: college entrance language.*

Students planning graduate study in bacteriology should have preparation in general chemistry, qualitative and quantitative analysis, organic chemistry, physics, and introductory courses in the biological sciences. In addition, training in physical chemistry and calculus is desirable. Deficiency in any of the subjects listed does not necessarily preclude admission but may increase the time necessary to earn a degree.

Well-equipped laboratories are available. These branches of microbiological research in which the staff is experienced and especially interested include morphology and cytology, physiology and biochemistry, genetics, bacteriophagy, and systematic and applied bacteriology.

It is to be emphasized that in addition to a creditable performance in the formal program of courses leading to a broad knowledge of bacteriology and related fields, the graduate student registered for an advanced degree is expected to demonstrate ability to plan and conduct independent and original research. The successful culmination of a worthy research project is considered the most important prerequisite to the Ph.D. degree.



**BIOCHEMISTRY (AG.)**

*Faculty:* R. H. Barnes, L. J. Daniel, M. Gibbs, G. P. Hess, R. W. Holley, A. L. Neal, W. L. Nelson, H. H. Williams, L. D. Wright, R. G. Young. *At Geneva:* A. W. Avens, D. B. Hand, Z. I. Kertesz, F. A. Lee, G. L. Mack, L. M. Massey, Jr., L. R. Mattick, W. B. Robinson, J. P. Van Buren, A. C. Wagenknecht.

**APPROVED MAJOR AND MINOR SUBJECT**

Biochemistry 1, 2, 4

A student desiring to undertake graduate work in biochemistry should possess a sound chemistry background and a broad training in the biological and physical sciences. Opportunity will be provided by the extension of the period of graduate study for the candidate to correct minor deficiencies in the above areas. It is recommended that those entering with a strong background in chemistry should choose a biological subject as a minor, and conversely, those with a strong background in biology should choose a branch of chemistry as a minor. The program of study, including the selection of minor subjects, will be governed by the student's background, needs, and interests. By proper selection of minor subjects the student may focus his graduate study on animal or plant biochemistry but is expected to be proficient in the general field.

Candidates who choose biochemistry as a minor should have adequate training in chemistry and the biological sciences.

The laboratories at Ithaca are especially equipped for research in enzyme chemistry, intermediary metabolism, nutritional biochemistry, analytical methods, plant and animal investigations, and food biochemistry (at Ithaca and Geneva).

Several assistantships are available both at Ithaca and at Geneva each year, and applications for these should be made directly to the faculty representative.

**BOTANY (AG.)**

*Faculty:* H. P. Banks, D. W. Bierhorst, D. G. Clark, R. T. Clausen, J. M. Kingsbury, L. F. Randolph, F. C. Steward, J. F. Thompson, C. H. Uhl, and C. S. Yokum. *At Geneva:* B. E. Clark, W. F. Crosier, John Einset. *At the Bailey Hortorium:* G. H. M. Lawrence, H. E. Moore, Jr.

**APPROVED MAJOR AND MINOR SUBJECTS**

General Botany 2, 4

Cytology 1, 2, 3, 4

Paleobotany 1, 2, 3, 4

Phycology 1, 2, 3, 4

Plant Morphology and Anatomy 1, 2, 3, 4

Plant Physiology 1, 2, 3, 4

Plant Taxonomy and Ecology 1, 2, 3, 4

*Language requirement for Master's degree: college entrance French and/or German or proficiency before completion of second residence unit.*

**GENERAL REQUIREMENTS FOR ALL DEGREES**

An adequate training in plant morphology and anatomy, plant physiology, and plant taxonomy is required of all candidates with major subjects in the Field of Botany

**REQUIREMENTS FOR MAJOR SUBJECTS**

Additional basic requirements for the major subjects are as follows:

**GENERAL BOTANY.** Additional requirements will be determined in each individual case.

**CYTOLOGY AND CYTOGENETICS.** An adequate knowledge of cytology and two of the

following: genetics or plant breeding, plant morphology and anatomy, plant physiology, or plant taxonomy. Professors Randolph and Uhl.

**PALEOBOTANY.** Additional training in plant morphology and anatomy, and adequate knowledge of paleobotany and general stratigraphic geology. Professor Banks.

**PHYCOLOGY.** An adequate knowledge of morphology and taxonomy. Additional training in cryptogamic botany and physiology. Professor Kingsbury.

**PLANT MORPHOLOGY AND ANATOMY.** Additional training in plant morphology and anatomy and plant taxonomy, and adequate knowledge of cytology, genetics, or paleobotany. Professors Bierhorst and Banks.

**PLANT PHYSIOLOGY.** Additional training in plant physiology, and adequate knowledge of chemistry, a general knowledge of mathematics and physics, and training in bacteriology, genetics, mycology, plant pathology, or soils. Professors Clark, Steward, Thompson, and Yocum.

**PLANT TAXONOMY AND ECOLOGY.** Additional training in plant taxonomy and ecology and an adequate knowledge of morphology, genetics and cytology. Professor Clausen.

Opportunity for graduate research in plant taxonomy, with similar requirements, is also available to a limited number of graduate students at the Bailey Hortorium. Research programs at the Hortorium deal primarily with cultivated plants but are necessarily based on studies of indigenous plant populations. Professors Lawrence and Moore.

## CONSERVATION (AG.)

*Faculty:* J. P. Barlow, C. O. Berg, W. C. Dilger, W. R. Eadie, A. W. Eipper, L. S. Hamilton, W. J. Hamilton, Jr., O. H. Hewitt, P. P. Kellogg, R. R. Morrow, A. M. Phillips, Jr., E. C. Raney, C. G. Sibley, G. A. Swanson, D. A. Webster.

### APPROVED MAJOR AND MINOR SUBJECTS

Fishery Biology 1, 2, 3, 4	Oceanography 1, 2, 3, 4
Forest Conservation 3, 4	Vertebrate Zoology 1, 2, 3, 4 (including
Natural Resources Conservation 1, 2, 3, 4	herpetology, ichthyology, mammalogy, and ornithology)
	Wildlife Management 1, 2, 3, 4

*Language requirement for the Master's degree: college entrance French and/or German or an approved substitute.*

Both minor subjects for the doctorate should not be chosen within the Field of Conservation if the major subject is from the same field. A written prequalifying examination is given during the first week of the fall term to all doctoral candidates.

To undertake graduate study in the biological subjects the student should be well prepared in biological sciences and should have or must acquire a foundation in the specialized field of study which he intends to pursue. A strong background in the other biological and physical sciences is highly desirable, and a working knowledge of statistical methods is important in all fields. To undertake graduate study in natural resources conservation, the student must come adequately trained in an existing professional field concerned with the management of natural resources, and he must (with only rare exceptions) have professional job experience. Staff members are available to direct graduate study during the regular University Summer Session, and selected summer courses are offered.

Members of the staff will be interested in directing research in the fields as listed: J. P. Barlow, oceanography and marine ecology; W. C. Dilger, ornithology and comparative vertebrate ethology; W. R. Eadie, mammalogy; A. W. Eipper, freshwater fisheries management; L. S. Hamilton, natural resources conservation and

forest conservation; W. J. Hamilton, mammalogy and herpetology; O. H. Hewitt, wildlife management; P. P. Kellogg, ornithology and biological acoustics; R. R. Morrow, forest conservation; A. M. Phillips, nutrition and physiology of fishes; E. C. Raney, ichthyology and management of coastal fisheries; C. G. Sibley, ornithology; G. A. Swanson, wildlife management and natural resources conservation; D. A. Webster, freshwater fisheries management.

Attention is also directed to the fields of study and courses offered in the Fields of Botany (Ag.), Zoology (Arts), and Entomology and Limnology (Ag.). Graduate study in conservation education is directed under the Nature, Science, and Conservation Education Program (Ed.).

## DAIRY SCIENCE (AG.)

*Faculty:* Paul A. Buck, A. C. Dahlberg, B. L. Herrington, R. F. Holland, W. K. Jordan, F. V. Kosikowski, V. N. Krukovsky, R. P. March, H. B. Naylor, W. F. Shipe, Jr., J. C. White.

## APPROVED MAJOR AND MINOR SUBJECTS

Dairy Science 1, 2, 4

Dairy Chemistry 1, 2, 4

The research interests of the individual members of the staff are broad, but, in general, they may be indicated as follows: R. F. Holland, market milk and related products; A. C. Dahlberg, technology of milk products; B. L. Herrington, physico-chemical studies of milk products; W. K. Jordan, dairy engineering, ice cream, and concentrated milk products; F. V. Kosikowski, biochemistry, bacteriology, and technology of dairy products; Vladimir N. Krukovsky, chemistry of milk and fat-containing food products; R. P. March, handling of milk on the farm and in the fluid milk plant; H. B. Naylor, dairy bacteriology; W. F. Shipe, Jr., chemical studies of dairy products; J. C. White, sanitary and technical problems of milk and milk products.

Those intending to major in dairy science should have preparation in calculus; physics; bacteriology; qualitative, quantitative, and organic chemistry; and in dairy industry.

Those intending to major in dairy chemistry should offer calculus; physics; qualitative, quantitative, organic, and physical chemistry. Training in dairy industry is desirable but not essential. Deficiency in any of the subjects listed is not necessarily a bar to admission, but it may increase the time needed to earn the degree.

In general, graduate students are expected to acquire a broad knowledge of the chemical, physical, and biological properties of milk and its products. However, mastery of the subject material and the acquisition of residence units alone are not sufficient to earn the degree. Candidates must show that they have matured as students, and that they are able to conduct independent and intensive study in the laboratory and in the library.

## ENTOMOLOGY AND LIMNOLOGY (AG.)

*Faculty:* C. O. Berg, J. L. Brann, J. E. Dewey, Henry Dietrich, E. J. Dyce, Thomas Eisner, H. E. Evans, J. G. Franclemont, G. G. Gyrisco, W. T. Keeton, C. S. Koehler, D. J. Lisk, J. G. Matthyse, R. A. Morse, A. A. Muka, J. A. Naegele, C. E. Palm, R. L. Patton, *David Pimentel*, W. A. Rawlins, H. H. Schwardt, Maurie Semel (at Riverhead), B. V. Travis, L. D. Uhler, T. C. Watkins, D. A. Webster, M. H. J. Weiden, P. H. Wooley, R. G. Young. *At Geneva:* J. A. Adams (at Poughkeepsie), P. J. Chapman, A. C. Davis, R. W. Dean (at Poughkeepsie), F. L. Gambrell, E. H. Glass, G. E. R. Hervey, S. E. Lienk, F. L. McEwen, G. A. Schaefer, P. R. Sferra, E. H. Smith, E. F. Taschenberg (at Fredonia).

**APPROVED MAJOR AND MINOR SUBJECTS**

Apiculture 1, 2, 3, 4	Insect Physiology 1, 2, 3, 4
Insect Ecology 1, 2, 3, 4	Insect Toxicology 1, 2, 3, 4
Economic Entomology 1, 2, 3, 4	Insecticide Chemistry 1, 2, 3, 4
Insect Morphology 1, 2, 3, 4	Medical Entomology 1, 2, 3, 4
Insect Pathology 1, 2, 3, 4	Parasitology 1, 2, 3, 4
Insect Biochemistry 1, 2, 3, 4	Limnology 1, 2, 3, 4
Insect Taxonomy 1, 2, 3, 4	Entomology 4

*Language requirement for the Master's degree: proficiency in one language before the last term of residence, or exemption by the Special Committee.*

Excellent opportunities are offered in the Field of Entomology and Limnology for graduate study in all phases of biology (ecology, morphology, physiology, and taxonomy) and/or in the technology of insect control. Emphasis of study and research is on insects and related invertebrates; these are ideally suited for zoological investigations because of their numbers and ease of manipulation in laboratory and nature. The interests of the staff are broad and are well qualified to direct study and research in the subjects listed.

To undertake graduate study the student should be well prepared in the fundamentals of biology, physics, chemistry, and certain basic arts and must have or acquire a foundation in the field of study which he pursues. In the summer, members of the staff present a limited number of selected courses during the six-week Summer School of Cornell University and are also available to direct research of graduate students.

Special facilities for study and research include the finest entomological library, an extensive insect collection, an insectary, greenhouses, and numerous well-equipped laboratories.

**FLORICULTURE AND ORNAMENTAL HORTICULTURE (AG.)**

*Faculty:* W. J. Boodley, J. F. Cornman, R. I. Fox, R. W. Langhans, R. E. Lee, A. M. S. Pridham, R. J. Scannell, J. G. Seeley, H. B. Tukey, Jr.

**APPROVED MAJOR AND MINOR SUBJECT**

Floriculture and Ornamental Horticulture: 1, 2, 4

*Language requirement for Master's degree: proficiency in either French or German before completion of second residence unit, or a substitute approved by the candidate's Special Committee.*

Members of the staff of this field are concerned with greenhouse crops, nursery crops, turf, plant materials, breeding of ornamental plants, and the problems of landscaping as applied to small properties.

Since many of the problems dealing with greenhouses and nursery crops, turf, and the breeding of ornamental plants are basically those of plant response with relation to the environment, it is expected that the entering graduate student will have adequate preparation in elementary horticulture, botany, plant physiology, genetics, pathology, agronomy, entomology, chemistry and physics. Studies relating to the propagation, nutrition, culture and improvement of ornamental plants may be undertaken as research for an advanced degree and should be approached from the standpoint of the basic sciences. Consequently, it is appropriate to select minor subjects of study from physiology, anatomy, morphology, taxonomy, pathology, genetics, agronomy, entomology, agricultural economics, agricultural engineering, etc.

Studies involving the use of plant materials and problems of design relating to landscape service for small properties may be suitable, in which case it is expected

that the student will have an adequate background in the basic principles of horticulture and plant science as well as in design and drawing.

Graduate students interested in problems concerned with the revision of taxonomic groups of ornamental plants are referred to the section of this Announcement describing the facilities of the L. H. Bailey Hortorium (page 78).

## FOOD AND NUTRITION (H.E.)

*Faculty:* R. H. Barnes, A. M. Briant, J. H. Fryer, H. M. Hauck, E. E. Hester, F. A. Johnston, K. Longree, C. M. McCay, N. Mondy, K. J. Newman, C. J. Personius, P. Snow, G. Steininger, C. M. Young.

### APPROVED MAJOR AND MINOR SUBJECTS

Food and Nutrition 1, 2, 4

Food 1, 2, 3, 4

Nutrition 1, 2, 3, 4

General Home Economics 5

A candidate wishing to major in this field, whose studies include preparation equivalent to that of an undergraduate major in the Field of Food and Nutrition, i.e., basic courses in food and nutrition, biochemistry, bacteriology, physics and physiology, may begin graduate studies immediately. A student whose preparation is deficient in one or more areas may be required to register as a provisional candidate until he has made up the deficiencies.

Students with a major or minor in the Field of Food and Nutrition may select from a variety of courses, seminars, and experiences in independent study. Each student plans his program in consultation with his Special Committee, after consideration of his previous background and purpose in graduate study. Minors are selected with the candidate's professional interest in mind. For students with a major in the Field of Food and Nutrition, suggested minors in addition to those within the field include biochemistry, physiology, bacteriology, botany, statistics, anthropology, sociology, education, and other areas of home economics. General Home Economics may be elected for a minor at the M.S. level only.

Students in nutrition may be admitted to candidacy for the general degrees (M.S. or Ph.D.) as described above, or the professional degree, Master of Nutritional Science (M.N.S.). A listing and description of courses in the M.N.S. program are to be found in the *Announcement of the Graduate School of Nutrition*.

Inquiries should be addressed to the Graduate Representative, Food and Nutrition, Van Rensselaer Hall, Cornell University.

Members of the staff will direct research in the following: studies in food: Professors Briant, Hester, Longree, Mondy, Personius, and Snow; studies in nutrition: Professors Barnes, Fryer, Hauck, Johnston, McCay, Newman, and Steininger.

## FOOD SCIENCE AND TECHNOLOGY (AG.)

*Faculty at Geneva:* D. B. Hand, G. J. Hucker, Z. I. Kertesz, R. L. LaBelle, F. A. Lee, L. R. Mattick, J. C. Moyer, C. S. Pederson, W. B. Robinson, R. S. Shallenberger, D. E. Wilson. *At Ithaca:* R. C. Baker, R. H. Barnes, Alice M. Briant, Paul A. Buck, R. K. Finn, J. D. Hartman, B. L. Herrington, Catherine J. Personius, Ora Smith, R. M. Smock, G. H. Wellington.

### APPROVED MAJOR AND MINOR SUBJECT

Food Science and Technology 1, 2

*Language requirement for the Master's degree: proficiency in French, German, or Russian immediately upon admission to candidacy, or completion of one of the six-hour graduate language reading courses.*

Students planning graduate study in food science and technology should have

preparation in one of the following fields: bacteriology, chemistry, or engineering. It should be noted that the members of this field are associated with many different departments of the University. Research on meats, for example, is carried on in the Department of Animal Husbandry; research on potato processing is carried on in the Department of Vegetable Crops. All course work must be taken on the Ithaca campus, but doctoral candidates may elect to conduct their research at the Experiment Station in Geneva where a new multimillion dollar pilot plant and laboratory is nearing completion. A smaller pilot plant is located on the Ithaca campus, which supplements the research facilities of the departments specializing in raw materials.

In addition to this diversity of facilities, two separate programs are available at the Master's level. Students may be admitted to candidacy for the general degree, M.S., or for the professional degree, Master of Food Science (M.F.S.).

The M.F.S. program places less emphasis on research and more emphasis on course work. A listing and description of courses in the M.F.S. program are to be found in the *Announcement of the Graduate School of Nutrition*.

## GENERAL BIOLOGY (AG.)

*Faculty:* Thomas Eisner, W. T. Keeton, L. D. Uhler.

### APPROVED MAJOR AND MINOR SUBJECT

General Biology 2, 4

A Master's degree in general biology is offered for students who are graduates of small colleges, whose subject matter in the biological sciences is limited, and who plan to teach in small colleges or high schools. It is a continuation of basic subject matter courses selected to fill in gaps existing in their training. Such students are required to write a standard thesis involving a review of the literature and planned experimentation, or an essay which involves a complete review of the literature on their selected topic. These students usually work under Professor Uhler.

In addition to those in the above category, students who wish to pursue research on a problem of a basic biological nature, while at the same time devoting their course work to obtaining a needed broad background in science, may major in general biology. These students usually work under Professor Keeton or Professor Eisner. A standard research thesis is required.

Students who plan to do research in a more specific field of science may select general biology as a minor to help round out their subject matter background.

## PLANT BREEDING (AG.)

*Faculty:* R. E. Anderson, M. H. Emmerling, H. L. Everett, W. T. Federer, N. F. Jensen, A. A. Johnson, E. J. Kinbacher, C. C. Lowe, H. M. Munger, R. P. Murphy, R. L. Plaisted, D. S. Robson, R. R. Seane, A. M. Srb, R. G. D. Steel, Bruce Wallace, D. H. Wallace. At Geneva: J. D. Atkin, D. W. Barton, J. Einset, K. W. Hanson, R. C. Lamb, G. L. Slate, R. D. Way.

### APPROVED MAJOR AND MINOR SUBJECTS

Plant Breeding 1, 2, 4

Genetics 1, 2, 4

Biometry and Statistics 3, 4

*Language requirement for the Master's degree: proficiency in one language before completion of second residence unit, or substitute approved by the field.*

Students who are interested in crop improvement through breeding will register in *plant breeding*. Problems for research may involve studies of breeding techniques, the application of genetic principles to breeding, and the correlation of knowledge from other fields in attacks on problems such as yield, quality, adaptability, and



disease and insect resistance. The department now has active research projects with most of the important field and vegetable crops of New York, and certain materials from these projects are available for graduate student problems. For students who will register in *genetics*, the research problems generally will involve genic and chromosomal analyses of hereditary and evolutionary phenomena. Almost any suitable biological materials can be utilized, but the most readily available ones will be those currently being studied by the departmental staff in genetic investigations. For those students to whom problems of experimental technic and mathematical analysis of biological data hold the greater appeal, registration for a minor will be in *biometry and statistics*, and for a major will be in the Field of Statistics (p. 72).

It is advisable that the student entering upon graduate work be well grounded in the fundamentals of the natural sciences. He should have had courses in inorganic and organic chemistry, college algebra, botany or zoology or biology, and plant, animal, or human physiology. Students intending to specialize in biological statistics will find it to their advantage to have additional training in mathematics. Broad training and experience in agriculture are essential for those planning to major in the Field of Plant Breeding.

Students majoring in plant breeding or genetics will find it necessary to remain in Ithaca during the summer, or to make satisfactory arrangements elsewhere for growing and studying the material used in connection with their research problems.

Members of the staff will be especially interested in directing research in the field as listed, although research will not be limited to these fields: Professor Murphy, forage crops—genetics and breeding; Professor Lowe, forage crops—genetics and breeding; Professor Anderson, forage crops—genetics and breeding; Professor Seaney, birdsfoot trefoil—genetics and cytogenetics; Professor Jensen, small grains—genetics and breeding; Professor Kinbacher, small grains—winter hardiness; Professors Munger and York, vegetable crops—genetics and breeding; Professor Plaisted, potatoes—genetics and cytogenetics; Professor Everett, corn genetics and breeding; Professor Johnson, extension and pure seed programs; Professor Srb, biochemical genetics; Professor Federer, biological statistics and design of experiments; Professor Steel, biological statistics and multivariate analysis; and Professor Robson, biological statistics. Prospective students will find it to their advantage to correspond with the staff member whose interests are most closely related to their own some months in advance of the time they wish to enter, since only a limited number of students can be accommodated.

## PLANT PATHOLOGY (AG.)

*Faculty:* C. W. Boothroyd, R. C. Cetas, R. S. Dickey, A. W. Dimock, K. H. Fernow, M. B. Harrison, E. D. Jones, G. C. Kent, R. P. Korf, W. F. Mai, R. L. Millar, P. E. Nelson, A. G. Newhall, K. G. Parker, L. C. Peterson, W. F. Rochow, A. F. Ross, A. F. Sherf, L. J. Tyler, D. S. Welch, R. E. Wilkinson, C. E. Williamson. *At Geneva:* A. J. Braun, W. F. Crosier, R. M. Gilmer, J. M. Hamilton, J. J. Natti, D. H. Palmiter (at Poughkeepsie), W. T. Schroeder, M. Szkolnik.

## APPROVED MAJOR AND MINOR SUBJECTS

*(The faculty usually does not advise a minor in one of these subjects when the major is in the other.)*

Mycology 1, 2, 3, 4

Plant Pathology 1, 2, 3, 4

*Language requirements for Master's degree: proficiency in French or German before completion of second residence unit, or substitute approved by the field.*

Majors in plant pathology are expected to become familiar with the principles underlying the initiation of infection by the major groups of plant pathogens (bacteria, fungi, viruses, and nematodes), the course of infection, the relation of environ-

ment to disease, the principles and methods of disease control, and the interrelation of pathogen and suspect. The student must become familiar with the various techniques useful in studying the details of the diseases and of their control. Individual research will be carried on in one phase of the field. Students should spend their summers in field work under professors' direction in order to come into contact with diseases under natural conditions and the practical aspects of control. They should have some practice in teaching. Candidates should have a knowledge of elementary physics, inorganic chemistry, organic chemistry, general botany, plant histology and anatomy, and plant physiology. Opportunity is afforded for further study in these fields, but students with deficiencies cannot expect to complete work for the degree in the minimum amount of residence.

Majors in mycology are expected to become familiar with the broad field of mycology, including morphology, taxonomy, physiology, genetics, and cytology. It is expected that the student will become proficient in the various techniques used in the study of fungi. Individual research will be concentrated in one phase of the field. Students will profit by spending their summers in the field, collecting and examining fungi in the fresh state. Candidates should possess a thorough grounding in general botany. Opportunity is afforded for further study in related fields, such as taxonomic botany, morphology and anatomy, microtechnique, plant physiology, biochemistry, genetics, and cytology.

A limited number of assistantships providing opportunities for research and teaching are available in the department.

### **POMOLOGY (AG.)**

*Faculty:* G. D. Blanpied, D. Boynton, L. J. Edgerton, E. G. Fisher, A. J. Heinicke, M. B. Hoffman, R. M. Smock. At Geneva: K. D. Brase, J. C. Cain, O. F. Curtis, J. Einset, C. G. Forshey, K. W. Hanson, R. C. Lamb, L. E. Powell, Jr., N. J. Shaulis, G. L. Slate, J. P. Tomkins, R. D. Way.

### **APPROVED MAJOR AND MINOR SUBJECT**

Pomology 1, 2, 4

Laboratory, greenhouse, orchard, and cold storage facilities at Ithaca and Geneva are available for graduate study. Special facilities for research in fruit breeding, nursery stock investigations, and other phases of pomology are also available at Geneva.

Minor subjects may be such as plant physiology, plant anatomy, cytology, soil chemistry, soil physics, biochemistry, and chemistry. One minor in botany, particularly plant physiology, is urged.

To enter upon graduate work, the student should have the equivalent of the following courses: general botany, elementary plant physiology, economic entomology, elementary plant pathology, introductory inorganic and elementary organic chemistry, elementary pomology, and systematic pomology.

Candidates for the Master's degree should spend one summer at Ithaca or Geneva or in the field investigating their special subject. At least two summers of work are expected of candidates for the doctorate.

### **POULTRY HUSBANDRY (AG.)**

*Faculty:* R. C. Baker, J. H. Bruckner, R. K. Cole, F. W. Hill, F. B. Hutt, D. R. Marble, M. C. Nesheim, M. L. Scott, A. van Tienhoven.

### **APPROVED MAJOR AND MINOR SUBJECTS**

Animal Genetics (see page 74)

Animal Nutrition (see page 75)

Animal Physiology (see pp. 74, 86)

Food Science and Technology  
(see page 81)

Poultry Husbandry 2, 4

It is desirable that graduate students electing a major subject in these fields should have had some undergraduate training in poultry husbandry, some experience in that field, and courses in zoology or animal biology, physiology, physics, and chemistry. Other requirements will be specified by the major adviser.

It is recommended that those candidates for the Master's degree who expect to become candidates for the doctorate study one or more foreign languages.

## PSYCHOLOGY (ARTS)

*Faculty:* A. L. Baldwin, U. Bronfenbrenner, R. H. Dalton, F. S. Freeman, J. J. Gibson, A. C. Goldstein, J. E. Hochberg, W. W. Lambert, H. S. Liddell, R. B. MacLeod, T. A. Ryan, P. C. Smith, R. R. Zimmermann.

### APPROVED MAJOR AND MINOR SUBJECTS

Clinical Psychology 3	History of Psychology and Systematic Psychology 1, 2, 3, 4
Comparative Psychology 1, 2, 3, 4	Industrial Psychology 1, 2, 3, 4
Differential Psychology and Psychological Tests 1, 2, 3, 4	Personality and Social Psychology 1, 2, 3, 4
Experimental Psychology 1, 2, 3, 4	Physiological Psychology 1, 2, 3, 4
Experimental Psychopathology 1, 2, 3, 4	
General Psychology 2, 4	

*Language requirement for the Master's degree: proficiency in French or German before the final examination.*

The research laboratories of the Department of Psychology (*Arts*) are located in Morrill Hall and at the Cornell Behavior Farm. Additional research facilities are provided by the Department of Sociology and Anthropology (*Arts*), the Department of Child Development and Family Relationships (*H.E.*), the School of Education (*Ed*), and the School of Industrial and Labor Relations (*I.L.R.*). Since much of the graduate instruction and research in psychology is conducted co-operatively, the prospective student should consult the Announcements of each of these departments. Brochure containing additional information is available from the Department of Psychology, Morrill Hall.

Applicants for admission in Psychology are required to submit scores for the Graduate Record Examination (Advanced Test in Psychology and Aptitude Test).

## SEED TECHNOLOGY (AG.)

*Faculty:* At Geneva, B. E. Clark, W. F. Crosier, D. D. Dolan, L. W. Nittler. At Ithaca: A. A. Johnson, H. A. MacDonald, L. J. Tyler.

### APPROVED MAJOR AND MINOR SUBJECT

Seed Technology 1, 2, 4

The Department of Seed Investigations at the Geneva Experiment Station has laboratory, greenhouse, and trial ground facilities for research in various aspects of seed technology including seed identification, seed purity determinations, dormancy and germination of seeds, detection of seed-borne diseases, measurement of genetic purity, and the evaluation and preservation of germ plasm. A student desiring training in the field of seed technology may select a thesis problem in this field and conduct research at Geneva.

## STATISTICS (AG., ARTS, ENG., I.L.R.)

(See page 72.)

**VEGETABLE CROPS (AG.)**

*Faculty:* E. E. Ewing, J. D. Hartman, F. M. R. Isenberg, W. C. Kelly, P. A. Minges, H. M. Munger, E. B. Oyer, A. J. Pratt, G. J. Raleigh, R. F. Sandsted, *Ora Smith*, Raymond Sheldrake, R. D. Sweet, D. H. Wallace. At Geneva: J. D. Atkin, D. W. Barton, W. T. Tapley, M. T. Vittum. At Riverhead: S. L. Dallyn, R. L. Sawyer.

**APPROVED MAJOR AND MINOR SUBJECT**

Vegetable Crops 1, 2, 4

Research and study in Vegetable Crops is the application of fundamental scientific knowledge and methods to the solution of the problems of production, handling, and processing in the vegetable industry. Types of work involved include studies of control of flowering and fruiting; development and adaptation of varieties; field plot technique; chemical weed control; the use of plant growth regulators; major and minor element fertilization, irrigation, and other soil management practices; physiological diseases; effects of cultural practices and methods of harvesting, shipping, packaging, storing, and merchandising on quality; taste panel techniques; processing the potato; development and standardization of objective tests for quality. In many cases students do basic research in physiology, biochemistry, genetics, or the like in attempting to solve problems.

To enter upon graduate work in Vegetable Crops it is not necessary for the student to have done his undergraduate work in horticulture. More important, in some cases, is a good background in basic sciences, interest in the plant side of agriculture, and, often, farm experience. It is expected, however, that by the time he has completed his graduate training the student will have a broad knowledge of the whole Field of Vegetable Crops. Work on a Vegetable Crops major may also require a considerable amount of study in certain fields, such as statistics, plant physiology, or biochemistry, other than those in which he is minoring.

The graduate program can provide training for extension or teaching careers as well as for research. Many staff members do either extension or teaching along with research, and they may be selected as members of the Special Committee. Persons now in extension, who desire to take advanced training, especially at Master's degree level, have every opportunity to select courses and thesis problems which will relate to their work. Visits to production areas and marketing centers are encouraged. Assistantships are available that provide experience in extension and in teaching as well as in research.

Students expecting to continue their graduate studies should prepare to meet the language requirement for the doctorate during the course of their preparation for the Master's degree. There is no foreign language reading requirement for the M.S.

**VETERINARY MEDICINE (VET.)**

*Faculty:* D. W. Baker, J. A. Baker, J. Bentinck-Smith, C. I. Boyer, Jr., D. W. Bruner, C. L. Comar, A. G. Danks, D. D. Delahanty, R. W. Dougherty, H. H. Dukes, J. A. Dye, H. E. Evans, Julius Fabricant, M. G. Fincher, F. H. Fox, J. C. Geary, J. H. Gillespie, H. L. Gilman, R. E. Habel, M. R. Kare, R. W. Kirk, E. P. Leonard, P. P. Levine, K. McEntee, W. J. Mathey, Jr., M. E. Miller, L. L. Nangeroni, P. Olafson, M. C. Peckham, G. C. Poppensiek, C. G. Rickard, S. J. Roberts, B. E. Sheffy, J. R. E. Taylor, J. H. Whitlock.

**APPROVED MAJOR AND MINOR SUBJECTS**

Veterinary Anatomy 1, 2, 3, 4  
 Animal Physiology 1, 2, 3, 4  
 Veterinary Pathology 1, 2, 3, 4  
 Pathogenic Bacteriology 1, 2, 3, 4  
 Veterinary Virology 1, 2, 3, 4  
 Veterinary Pharmacology 1, 2, 3, 4

Parasitology 1, 2, 3, 4  
 Radiation Biology 1, 2, 3, 4  
 Veterinary Medicine 1, 2, 3, 4  
 Veterinary Obstetrics and Diseases of  
 the Reproductive Organs 1, 2, 3, 4  
 Veterinary Surgery 1, 2, 3, 4

Facilities for graduate study and research in all fields of veterinary medicine are excellent. The College moved into an entirely new and modern physical plant in the summer of 1957. The laboratories and animal quarters are well designed and equipped for work in all the basic disciplines as well as in clinical applications. A large and varied clinic representing all domesticated animals is available as a source of material. The College operates several farms where large animals are housed under conditions simulating those of the farm. On one of these are the virus disease laboratories, a part of which is the Research Laboratory for Diseases of Dogs.

Graduate students may elect to work for the M.S. and Ph.D. degrees, or for a special degree known as the Doctor of Science in Veterinary Medicine (D.Sc. in V.M.). The latter has standards and requirements of the level of the Ph.D. degree but is a professional rather than a research degree. It is designed especially for experienced persons who need better background training in preparation for teaching or research.

In the clinical fields only candidates with the D.V.M. degree are accepted for graduate work. In the basic fields preference is generally given to veterinarians, but others are accepted.

A reading knowledge of German and French (or Spanish) is desirable for candidates for the Master's degree, but they are not required.

## ZOOLOGY (ARTS)

*Faculty:* H. B. Adelmann, J. M. Anderson, L. C. Cole, P. W. Gilbert, S. L. Leonard, H. A. Schneiderman, M. J. Singer, J. R. Vallentyne, W. A. Wimsatt.

### APPROVED MAJOR AND MINOR SUBJECTS

Biogeochemistry 1, 2, 3, 4	Ecology 1, 2, 3, 4
Comparative Anatomy 1, 2, 3, 4	Endocrinology 1, 2, 3, 4
Comparative and Cellular Physiology 1, 2, 3, 4	Histology and Embryology 1, 2, 3, 4
Comparative Neurology 1, 2, 3, 4	Invertebrate Zoology 1, 2, 3, 4

*Language requirement for the Master's degree: proficiency in German or French, to be established before the completion of the second residence unit.*

The Department of Zoology offers excellent opportunities for graduate study and research in all phases of zoology, but particularly in the descriptive and experimental aspects of the following special fields: (1) comparative and human anatomy, with emphasis on the functional approach, (2) comparative and cellular physiology, (3) general ecology, (4) endocrinology, (5) histology and embryology, (6) invertebrate zoology, (7) comparative and general neurology, and (8) limnology and biogeochemistry. Members of the staff are especially qualified to direct research in the subjects listed, but research need not be limited to these subjects. The research interests of the members of the staff are broad, but, in general, they may be summarized as follows: H. B. Adelmann, experimental embryology and the history of embryology; J. M. Anderson, general and comparative anatomy of invertebrates, with emphasis on the functional histology and histochemistry of organ systems; L. C. Cole, general ecology with special emphasis on population phenomena and the mathematical theory of populations; P. W. Gilbert, vertebrate functional anatomy, i.e., correlation of habits and activities of vertebrates with their morphology, biology of elasmobranch fishes with special emphasis on reproductive patterns and sense organs; S. L. Leonard, general endocrinology with special emphasis on the anatomical, physiological, and biochemical aspects of the mechanisms of hormone action, reproduction, growth, and metabolism; H. A. Schneiderman, cellular and comparative physiology, invertebrate endocrinology, growth, respiration, and intermediary



metabolism of insects, tissue culture, oxidative enzymes, physiological and biochemical effects of radiation; M. J. Singer, general and comparative neurology, experimental morphology, problems of growth and regeneration, and the physical chemistry of dye and protein interactions; J. R. Vallentyne, limnology, biogeochemistry of organic matter, and the origin of life; W. A. Wimsatt, histology, histophysiological and histochemical approach to problems of reproduction, comparative placentation, and hibernation.

Applicants for graduate study in zoology must take the Graduate Record Examination Aptitude and Advanced Biology Tests in sufficient time to permit consideration of the results along with the application for admission into the Graduate School.

All applicants should have completed the equivalent of a well-rounded college major in zoology, and should have some foundation in the particular phase of zoology they desire to pursue. Courses in organic chemistry and elementary physics should also have been completed. Although an exceptional student may be admitted without having completed the above requirements, he should then expect to remain in residence beyond the minimum period to make up the deficiencies.

In addition to the courses offered by the Department of Zoology (*Arts*), other courses of study that are often valuable to graduate students (either as individual courses or as minor subjects) are: chemistry (especially organic and physical chemistry), geology, mathematics, psychology, and physics (*Arts*); bacteriology, biochemistry, botany, conservation, entomology, genetics (Department of Plant Breeding), and physiology of reproduction (Department of Animal Husbandry) (*Ag.*); and physiology and radiation biology (*Vet.*).

## PHYSICAL SCIENCES

### AERONAUTICAL ENGINEERING (*ENGIN.*)

*Faculty:* S. H. Lam, E. L. Resler, Jr., N. Rott, W. R. Sears, D. L. Turcotte.

#### APPROVED MAJOR AND MINOR SUBJECTS

Aeronautical Engineering 1, 3, 4

Aerodynamics 4

In this field of graduate study emphasis is placed on the aeronautical sciences rather than mere proficiency in present-day techniques. Consequently, graduate students having aeronautical engineering as their major subject will be urged to select as their minor subjects the basic sciences, such as mathematics, physics, and mechanics.

Much of the research carried out in this field at Cornell is concerned with fundamental problems in the dynamics of fluids. Whenever possible, these investigations combine the techniques of theory and laboratory experiment, making use of the experimental facilities of the Graduate School of Aeronautical Engineering, on the campus. In every investigation, an attempt is made to correlate theory with observation and practical experience.

A group working under the direction of Professor Resler is investigating the dynamics of gases at extreme temperatures. Generally speaking, their interests lie in matters in which the sciences of physics and chemistry are finding application to the aerodynamics of propulsion systems and to flight of missiles and space vehicles. The branch of fluid mechanics called magnetohydrodynamics now forms an essential part of their activities. This brings the group into close contact with several other departments in the University. Another group, which includes Professors Rott and Sears, is carrying out research on subjects basic to modern wing theory and propulsion systems. These include investigations of the turbulent boundary layer and of three-dimensional boundary-layer problems in general.



Other investigations typical of the group's activities are shock-boundary-layer interaction and unsteady flow about wings and rotating compressors. The activities of this field include original research and course work in aeroelasticity, which involves the response of elastic structures to aerodynamic effects. Research in aeronautical structures is directed by Professor P. P. Bijlaard of the Field of Civil Engineering.

Candidates for the Ph.D. with a major in this field who do not already hold the Master's degree will be encouraged to matriculate first as candidates for the professional degree, M.Aero.E., under the jurisdiction of the Graduate School of Aeronautical Engineering. Information concerning this School and the degree M.Aero.E. will be found in the *Announcement of the College of Engineering*.

## ASTRONOMY (ARTS)

*Faculty:* J. P. Cox, T. Gold, R. W. Shaw.

### APPROVED MAJOR AND MINOR SUBJECTS

Astronomy 1, 2, 4

Astrophysics 1, 2, 4

*Language requirement for the Master's degree: proficiency in French or German.*

Applicants for admission are required to offer the equivalent of introductory astronomy, six hours of interpretational astronomy, six hours of electives in the Field of Astronomy, and evidence of the completion of sufficient work in physics and mathematics to assure the successful pursuance of advanced work in astronomy.

Candidates for the degree of Doctor of Philosophy with a major in astronomy or astrophysics are required to take one minor in physics unless a divided major is granted. In special cases a major in astronomy or astrophysics may consist partly of selected courses in physics. In such cases one minor need not be in physics.

Candidates electing a minor in the field may select such courses as meet their requirements, provided the necessary prerequisites are offered.

Students with advanced standing in the sciences or in mathematics who do not desire to major or minor in astronomy may be admitted after consultation with the professor in charge to such courses in astronomy as seem desirable.

The staff is particularly interested in research in geodetic astronomy, stellar spectroscopy, lunar photometry, theory of stellar interiors, radio astronomy, cosmology, magnetohydrodynamics, and space vehicle instrumentation.

## CHEMICAL ENGINEERING (ENGIN.)

*Faculty:* R. K. Finn, P. Harriott, J. E. Hedrick, C. W. Mason, F. Rodriguez, J. C. Smith, R. G. Thorpe, R. L. Von Berg, H. F. Wiegandt, C. C. Winding, R. York.

### APPROVED MAJOR AND MINOR SUBJECTS

Chemical Engineering, General 1, 2, 3, 4

Nuclear Process Engineering 1, 3

Chemical Processes and Process Control 1, 3, 4

Materials Engineering 1, 3, 4

Biochemical Engineering 1, 3

To qualify for admission, a student must have completed satisfactorily the equivalent of the fundamental work required by an accredited curriculum in chemical engineering. Outstanding students who have received a baccalaureate degree with a major in chemistry will also be considered for admission. Normally an extra year of residence is required of such students to make up work in engineering fundamentals.

Both Master's degree and doctoral candidates must choose one minor outside the field. Candidates for the Doctor's degree select the other minor and the major from

approved subjects within the field. Minor subjects may be chosen in many other fields, for example, in the other Fields of Engineering, or in the Fields of Chemistry, Physics, Mathematics, Business and Public Administration, or Industrial and Labor Relations.

Candidates are expected to pursue a course of study and research that will give them a deeper comprehension of the basic and applied sciences and will develop initiative, originality, and creative ability. In order to achieve this goal the student participates in graduate courses and seminars and must complete an original, individual investigation for a thesis. Doctoral theses must be based on experimental research. Master's theses may involve either experimental research or special projects in such fields as design, economics, and mathematical analysis. Specific programs are planned to fit the objectives of the student and to develop original thinking. An arbitrarily fixed series of courses is not required, but each student is expected to acquire a strong background in unit operations, chemical processes, thermodynamics, reaction kinetics, and applied mathematics.

Graduate courses are offered in unit operations, thermodynamics, reaction kinetics, economics, process control, biochemical engineering, nuclear engineering, materials, and the chemistry and technology of rubbers and plastics. Research work for a thesis may be in any of these same areas.

## CHEMISTRY (ARTS)

*Faculty:* A. C. Albrecht, S. H. Bauer, A. T. Blomquist, W. D. Cooke, D. G. Farnum, M. J. Goldstein, J. L. Hoard, J. R. Johnson, A. W. Laubengayer, F. A. Long, J. Meinwald, W. T. Miller, M. L. Nichols, R. A. Plane, R. F. Porter, L. T. Reynolds, H. A. Scheraga, M. J. Sienko, B. Widom, C. F. Wilcox, B. Wunderlich.

## APPROVED MAJOR AND MINOR SUBJECTS

Inorganic Chemistry 1, 2, 3, 4	Organic Chemistry 1, 2, 3, 4
Analytical Chemistry 1, 2, 3, 4	Physical Chemistry 1, 2, 3, 4
Theoretical Chemistry 1, 2, 3, 4	

*Language requirement for the Master's degree: proficiency in French or German or an approved substitute to be demonstrated upon admission; if satisfaction of the language requirement is delayed, an additional semester of residence is required.*

The program of graduate study in chemistry is designed to give a broad training in the fundamental knowledge of chemistry and in methods of research. A graduate student will ordinarily pursue these objectives by taking advanced courses, by participation in organized and informal seminars and discussions with his associates and faculty members, and by carrying out and reporting on a research project in his major subject. Upon completion of their study program, graduates normally go out to positions in research laboratories or to positions involving teaching and research.

Candidates for the degree of Master of Arts, Master of Science, or Doctor of Philosophy with major in chemistry will be expected to offer for admission the equivalent of an A.B. degree with a major in chemistry. Such training should include courses in general chemistry, qualitative and quantitative analysis, organic chemistry, physical chemistry, and mathematics and physics. Some experience with foreign languages, preferably German and either French or Russian, is also regarded as essential. In admitting students, emphasis is placed on quality of performance and promise for research as judged by those best acquainted with applicants. Unusually promising students may be admitted with deficiencies in undergraduate training. In such cases work designed to make up the deficiencies will be required, and more than the usual period of residence may be necessary.

Proficiency tests will be required of all entering candidates for advanced degrees (M.S. or Ph.D.) with a major in chemistry. These tests are given a few days before

registration for the fall term and cover the divisions of inorganic, analytical, organic, and physical chemistry. Each test will be about two and one-half hours in length and will cover material normally presented in elementary courses in the subjects listed above. The results of these tests will be used to aid the student's Special Committee in the planning of his program of study. While the results will not be considered in the usual sense of "passing" or "failing," low marks in one or more of the tests may require a preponderance of elementary courses during a term.

Graduate students are encouraged to carry on research during part of the summers, and a number of Summer Research fellowships are available for this purpose.

Graduate students are required to register with the Department of Chemistry on the registration days at the beginning of each term. Entering students will consult with the chairman of the departmental Graduate Scholarship Committee at this time.

In addition to the courses in chemistry (*Arts*), attention is directed to courses in chemical engineering, including chemical microscopy (*Engin.*), and to work in biochemistry, offered in the College of Agriculture.

A graduate student who desires to take a minor subject in chemistry with a major subject from some field other than chemistry will be required to offer or acquire a satisfactory background for advanced work. This will ordinarily consist of an introductory course in general chemistry and of intermediate courses prerequisite to advanced work in the minor subject in chemistry. The work in his minor subject in chemistry comprises advanced study planned with the approval of his Special Committee.

Specific inquiries from prospective graduate students are welcomed and should be addressed to the representative or to any member of the faculty. Applications for teaching or research assistantships should be addressed to the Chairman of the Department of Chemistry, Baker Laboratory.

## CIVIL ENGINEERING (*ENGIN.*)

*Faculty:* D. J. Belcher, M. Bogema, B. Broms, N. A. Christensen, G. P. Fisher, C. D. Gates, J. C. Gebhard, W. L. Hewitt, T. D. Lewis, W. O. Lynch, G. B. Lyon, R. E. Mason, W. McGuire, A. J. McNair, A. H. Nilson, W. L. Richards, J. B. Rogers, G. Winter.

### APPROVED MAJOR AND MINOR SUBJECTS

Drawing and Cartography 4	Sanitary Engineering 1, 2, 3, 4
Geodetic and Photogrammetric Engineering 1, 2, 3, 4	Sanitary Sciences 3, 4
Hydraulics 1, 2, 3, 4	Structural Engineering 1, 2, 3, 4
Hydraulic Engineering 1, 2, 3, 4	Soils Engineering 1, 2, 3, 4
Construction Engineering and Administration 1, 2, 3, 4	Transportation Engineering 1, 2, 3, 4
	Aerial Photographic Studies 2, 3, 4

To be admitted to graduate study in the Field of Civil Engineering, an applicant should ordinarily hold a Bachelor's degree in civil engineering from a school of recognized standing. However, arrangements may be made for exceptional cases when a student with undergraduate training in a different field, such as another branch of engineering, architecture, or the physical sciences, wishes to pursue graduate work in civil engineering. In such cases, additional residence may be required by the candidate's Special Committee. To be admitted the applicant must have been in at least the upper half of his class, or he must present other evidence which demonstrates his fitness to carry on graduate work.

The aim of graduate work in the studies grouped under civil engineering is not only to increase the student's proficiency in the more advanced phases of professional practice, but also to promote a deeper and broader understanding of the theoretical

and empirical basis of the field, including in many cases the boundaries of present knowledge.

In addition to formal courses, individual work under personal direction by members of the staff is available.

**DRAWING AND CARTOGRAPHY.** The Department offers advanced drawing courses which may be adjusted to the needs of a particular student. Cartography and map reproduction are closely allied with the mapping requirements of topographers, geologists, and social scientists.

**GEODETIC AND PHOTOGRAMMETRIC ENGINEERING.** The Geodetic and Photogrammetric Engineering Department offers a considerable number of advanced courses in topographic engineering, geodesy, geodetic engineering, photogrammetry, map projections, theory of errors, and land surveying. Courses in related fields with special application to surveying problems are available in other departments of the University, such as in astronomy, physics (optics and photography), mathematics, and geology (*Arts*), in regional and city planning (*Arch.*), and in real property (*Law*).

**HYDRAULICS AND HYDRAULIC ENGINEERING.** The Department of Hydraulics and Hydraulic Engineering offers a complete sequence of advanced courses in theoretical and experimental hydraulics, covering the subjects of hydrodynamics, advanced hydraulics, flow in open channels, hydraulic measurements, hydraulic models, pumps and turbines. Courses listed in hydraulic engineering deal with hydraulic structures, water power, rivers and harbors. Formal teaching is supplemented by informal discussions, demonstrations, laboratory experiments, and field trips. Seminars are held regularly with the participation of the staff, of graduate students, and of distinguished visitors.

In the Hydraulic Laboratory facilities are available for research and thesis work. Not infrequently, graduate students find part-time employment on laboratory projects. Graduate students may broaden their education by work in the allied fields of structural engineering, soils engineering, mechanical engineering, aeronautical engineering, agricultural engineering, mathematics, etc.

**MANAGEMENT ENGINEERING.** Graduate study in this area is intended to supplement the civil engineer's basic technical training with advanced studies in principles and methods of construction, management, economics, finance, and business law. These types of study are of importance in such work as municipal engineering, public administration, regional planning, city management, public housing, and valuation, as well as for the efficient and successful management of industry, construction contracting, and other lines of business with which the engineer may be connected.

**SANITARY ENGINEERING.** The Department offers a number of formal advanced courses in water supply, waste treatment, industrial and nuclear wastes, sanitary bacteriology, sanitary chemistry, and public health; in addition, it supervises informal courses in design and in subjects of special interest to individual students. For engineering students interested in the contributing sciences, minor work is available in chemistry, bacteriology, biology and in fluid mechanics. Special programs are arranged for students majoring in such fields as conservation and entomology as well as in other fields of engineering, i.e., chemical, mechanical, and agricultural.

Specialized laboratories are available for instruction and research in sanitary engineering and in the sanitary sciences; of special interest are the facilities for radioactive tracer studies.

Students often are employed within the Department on sponsored research projects.

**STRUCTURAL ENGINEERING AND SOILS ENGINEERING.** The Department of Structural and Soils Engineering offers a considerable number of advanced courses in the field of structural analysis and design, and in soils and foundation engineering. In addition, courses in the fields of elasticity, stability, plasticity, applied mathematics, engineering

materials, and other subjects are available in the Department of Mechanics and Engineering Materials (*Engin.*) and in the Department of Mathematics (*Arts*). Courses on airplane structures are available in the Graduate School of Aeronautical Engineering. Courses in soils engineering may be supplemented by instruction in closely allied subjects such as transportation (*Engin.*), geology (*Arts*), and agronomy (*Agr.*).

Experimental facilities include a large special bay for three-dimensional facilities, full-scale testing, and testing machines up to 400,000-pound capacity with height up to 20 feet, strain gage equipment of all current types, and special laboratories for structural model analysis and soil mechanics.

The Department regularly employs graduate students for assistance in theoretical and experimental work on research projects sponsored by government and private agencies.

**TRANSPORTATION ENGINEERING.** The formal offerings of the Department are contained in three general categories: highway and airport engineering, six courses; traffic engineering, three courses; and aerial photographic studies, two courses. The staff also offers additional instruction in various branches of aerial photographic studies, including engineering soil survey, construction planning, ground water, agricultural surveys for irrigation in arid areas, and advanced work in mineral surveys. The formal offerings in traffic engineering are supplemented both by advanced instruction within the Department and by course work in city and regional planning.

Laboratories are available for graduate study and research in bituminous materials, aggregates, soils, and other highway materials. In addition laboratory and field facilities are fully developed for aerial photographic studies and traffic engineering. Considerable emphasis is placed upon field work and practical experience. Opportunities for both are available for all phases of transportation engineering.

Students on leave from professional assignments may adjust their programs to fit their special interests and research problems.

## **ELECTRICAL ENGINEERING (*ENGIN.*)**

*Faculty:* P. D. Ankrum, R. Bolgiano, H. G. Booker, N. H. Bryant, L. A. Burckmyer, M. Cohen, W. W. Cotner, C. L. Cottrell, G. C. Dalman, N. DeClaris, L. F. Eastman, W. H. Erickson, T. Gold, W. E. Gordon, C. E. Ingalls, S. Linke, M. G. Malti, H. S. McGaughan, P. R. McIsaac, T. McLean, W. E. Meserve, B. Nichols, R. E. Osborn, J. L. Rosson, H. G. Smith, E. M. Strong, R. N. Sudan, N. M. Vrana, P. F. Weaver, S. W. Zimmerman.

### **APPROVED MAJOR AND MINOR SUBJECTS**

Electrical Engineering, General 1, 2, 3, 4	Control Systems Engineering 1, 2, 3, 4
Communication Engineering 1, 2, 3, 4	Illuminating Engineering 2, 3, 4
Power Engineering 1, 2, 3, 4	

As prerequisite for graduate work leading to the degree of M.S. or Ph.D. with a major in the Field of Electrical Engineering the candidate should have had the equivalent of the fundamental work required by an accredited undergraduate curriculum in the area of his major subject. The candidate must also supply definite evidence of scholarly interest and aptitude for advanced study. Though the Graduate Record Examination is not required of applicants in the Field of Electrical Engineering, applicants may well consider taking this examination, submitting its results along with their application for graduate work.

Considerable latitude is allowed in the selection of the minor subjects, provided that the entire program shows a unified purpose.

Adequate work in advanced physics and mathematics is required of candidates



for the degree of Ph.D. It is highly recommended that at least one of the two minor subjects be chosen in the fields of physics or mathematics or in other related fields outside the Field of Electrical Engineering.

The approved major and minor subjects listed above define broad areas in the Field of Electrical Engineering within which a student may plan a graduate program which best suits his needs. In addition to the formal courses listed in the *Announcement of the College of Engineering* members of the faculty are prepared to guide individual students in special topics and to arrange seminars for students interested in closely related lines of study and research. Proficiency is expected in all phases of the graduate program.

Members of the electrical engineering faculty are especially interested in directing graduate research in the following areas:

**ELECTRICAL ENGINEERING, GENERAL:** electric network theory, electrical measurements, materials in electrical engineering, radio astronomy, ionospheric studies, satellite instrumentation, magnetohydrodynamics, plasma studies, applied mathematics.

**COMMUNICATION ENGINEERING:** radio wave propagation, physical and microwave electronics, information theory, communication systems, acoustics.

**POWER ENGINEERING:** generation, transmission and distribution of electrical energy, power systems, electrical machinery, high voltage studies.

**CONTROL SYSTEMS ENGINEERING:** electrical machinery, industrial electronics, servo-mechanisms, analog and digital computers.

**ILLUMINATION ENGINEERING:** light sources, illumination design, vision and color, optics.

It is not desirable, nor is it intended, that the boundaries between these areas within the Field of Electrical Engineering be too rigidly defined. Rather, every effort is made to allow each student to pursue a program designed to give him a period of broad advanced study. To this end work in such subjects as thermodynamics, fluid mechanics, engineering materials, engineering physics, or astronomy, may be considered as partially fulfilling the requirements for a major or minor in electrical engineering, even though these subjects are not under the direct jurisdiction of the faculty of the School of Electrical Engineering.

## ENGINEERING MECHANICS AND MATERIALS (*ENGIN.*)

*Faculty:* P. P. Bijlaard, H. D. Block, H. D. Conway, E. T. Cranch, T. R. Cuykendall, J. W. Dally, J. O. Jeffrey, T. P. Mitchell, J. R. Moynihan, Y. H. Pao, H. C. Perkins, A. L. Ruoff, H. S. Sack, F. O. Slate.

### APPROVED MAJOR AND MINOR SUBJECTS

Mechanics 1, 2, 3, 4

Materials of Engineering 1, 2, 3, 4

Fluid Mechanics 1, 2, 3, 4

Graduate study in mechanics serves a twofold purpose. It trains men who intend to teach or to specialize in industrial research. The faculty believes that both these groups are best served by a broad fundamental training. Although the work in this field is devoted primarily to the mechanics of particles and rigid bodies and of deformable solids, all students are encouraged to take work also in the fields of the mechanics of liquids and gases and in the related fields of materials, physics, and mathematics. Opportunity is provided for graduate students interested in teaching to participate in the teaching program in the University. Opportunity is likewise provided for those primarily interested in industrial research to participate in projects in this field. Candidates planning to complete a Master's degree in one year must have had Advanced Strength of Materials (Engineering 1154) and Applied Mechanics (Engineering 1155) or the equivalent upon entering.

Engineering materials includes both theoretical and experimental procedures for evaluating the properties of engineering materials. All graduate students are urged to acquire fundamental training in both of these phases. In addition to the courses of the department, many other courses in mechanics and metallurgy (*Engin.*) and physics (*Arts*) should be considered as appropriate and necessary supplements in an adequate training in the field of materials engineering. Laboratory facilities are available for investigations in metals, concrete, cement, concrete aggregate, timber, plastics, fuels, lubricants, and miscellaneous materials.

## ENGINEERING PHYSICS (*ENGIN.*)

*Faculty:* H. G. Booker, D. D. Clark, D. R. Corson, E. T. Cranch, T. R. Cuykendall, P. L. Hartman, M. Kac, J. Lamarsh, H. F. Newhall, E. L. Resler, T. N. Rhodin, H. S. Sack, W. R. Sears, B. M. Siegel, G. V. Smith.

## APPROVED MAJOR AND MINOR SUBJECTS

Engineering Physics 1, 2, 4

The objective of graduate instruction in engineering physics is to offer concentrated study in a field which crosses conventional subject matter boundaries as well as to deepen and enlarge both the general scientific and the engineering background of the student. For this reason, the minor subject or subjects must be outside the field of the major subject and approved by the chairman of the Special Committee.

Though engineering physics undergraduate work is the preferred preparation for graduate work in engineering physics, students with a conventional physics or engineering background are readily accepted. Candidates for a Ph.D. in this field who do not already hold a Master's degree will be requested to matriculate first as candidates for a Master's degree; when they have become better acquainted with the work and the requirements in this field, they may, on the recommendation of their Special Committee, change to Ph.D. candidacy without incurring loss of time. No foreign language requirements exist for candidates for the Master's degree, though the faculty considers knowledge in foreign languages highly desirable.

Course work will be chosen principally from the courses offered in the College of Engineering and in the College of Arts and Sciences (Departments of Physics, Chemistry, Mathematics, etc.). The thesis can be done in any field represented by members of the engineering physics faculty, or, if the candidate's Special Committee approves, in other fields in which engineering physics may be significant.

**APPLIED SOLID STATE PHYSICS AND SCIENCE OF MATERIALS:** A concentrated research effort is spent on a basic study of the structure of solid surfaces and thin films and reactions on surfaces and their interrelations (Professors Rhodin and Siegel). A student in this group has the opportunity to become acquainted with techniques and equipment such as: ultrahigh vacuum, electron microscopy, electron diffraction, microbalance, etc., and with the interpretation of such measurements in the light of modern concepts and theories of surface physics. Related to this area is the development of electron optics and electron microscopic techniques (Professor Siegel).

Professors Cuykendall and Sack are interested in the study of the anelastic and plastic properties of solids (metals, ionic crystals, and plastics), and specialized equipment for growing single crystals and for studying their properties at low and high temperatures (between 4° and 1200° K) is available. Professors Hartman and Sack conduct research on electronic properties of semiconductors and insulators by means of measurements of luminescence, photoconductivity, dielectric properties, optical properties, etc.; this research is in close connection with similar work going on in the Department of Physics. A reactor (see below) will provide opportunity for work in radiation damage.

**APPLIED NUCLEAR SCIENCE AND NUCLEAR ENGINEERING:** A combined teaching and

research reactor (pulsed reactor "Triga"; operation to start January, 1961), a sub-critical assembly, a sigma pile, and a well equipped laboratory for nuclear instrumentation and measurements provide excellent facilities for research in nuclear engineering. Also a part of the reactor laboratory will be a critical assembly for study of reactor physics problems. The course and laboratory work on an advanced level offered in this Department are recognized by the AEC for its fellowship program. Professors Clark and Lamarsh are supervising the research, both experimental and theoretical, in this field.

While the work just mentioned is supported by funds from, or by contracts with the Department of Engineering Physics, the student may avail himself of research possibilities in other departments through the affiliation of engineering physics staff members with these departments. (Professors Hartman and Newhall, Department of Physics; Professor Booker, School of Electrical Engineering; Professors Resler and Sears, School of Aeronautical Engineering; Professor Cranch, Department of Engineering Mechanics; Professor Kac, Department of Mathematics; Professor Smith, School of Metallurgical Engineering). For the areas of interest of these members, and the facilities available, the student is referred to the descriptions of these departments' offerings in this Announcement.

## GEOGRAPHY

Students interested in graduate work in Geography will find study programs in many aspects of this subject in several fields described in this Announcement. Graduate degrees are not offered in the subject of Geography as such, but advanced study in Geography is possible by informally combining study in the constituent elements of the subject by arrangement with faculty members listed below.

Soil Science	Prof. Martin G. Cline
Geology	Prof. W. Storrs Cole
Land Economics	Prof. Howard E. Conklin
Food Economics	Prof. Herrell F. De Graff
Climatology	Prof. Bernard E. Dethier
Rural Sociology	Prof. Olaf Larson
Agricultural Geography	Prof. John W. Mellor
Economics of Development	Prof. Emmett Rice
Anthropology	Prof. Lauriston Sharp
Sociology	Prof. Joseph M. Stycos

Correspondence with members of the faculty in the student's special subject of interest is encouraged.

## GEOLOGY AND GEOGRAPHY (ARTS)

*Faculty:* A. L. Anderson, J. D. Burfoot, Jr., R. A. Christman, W. S. Cole, E. H. Muller, C. M. Nevin, J. W. Wells.

### APPROVED MAJOR AND MINOR SUBJECTS

Economic Geology 1, 2, 3, 4	Mineralogy and Petrology 1, 2, 3, 4
Geography 1, 2, 3, 4	Paleontology and Stratigraphy 1, 2, 3, 4
Geomorphology 1, 2, 3, 4	Structural Geology and Sedimentation 1, 2, 3, 4

*Language requirement for the Master's degree: proficiency in French or German or an approved substitute.*

Applicants for graduate study in geology must take the Graduate Record Examination Aptitude Test in sufficient time to permit consideration of the results along with the application for admission to the Graduate School.

Graduate work in geology may include investigation, under approved direction, in the field away from Ithaca.

**MATHEMATICS (ARTS)**

*Faculty:* A. Aepli, R. P. Agnew, W. Feit, W. H. J. Fuchs, I. N. Herstein, D. Hertzig, C. S. Herz, R. G. Heyneman, M. Kac, C. Kassimatis, J. C. Kiefer, S. Kochen, G. R. Livesay, I. Namioka, A. Nerode, P. Olum, H. Pollard, W. Rindler, J. B. Rosser, M. Schreiber, R. J. Walker, H. Widom, J. Wolfowitz.

**APPROVED MAJOR AND MINOR SUBJECTS**

Algebra 1, 2, 3, 4

Applied Mathematics 2, 3

Analysis 1, 2, 3, 4

Mathematics 1, 2, 4

Geometry 1, 2, 3, 4

*Language requirements for the Master's degree: proficiency in French, German or Russian immediately upon admission to candidacy.*

Prerequisites for candidacy are a knowledge of advanced calculus (including both theoretical and applied points of view) and modern algebra.

Candidates for the Master's degree are expected to obtain some understanding of mathematical thought, ordinarily by taking about twelve hours of courses at the graduate level. Qualifications for the Doctor's degree include a broad acquaintance with the basic subjects of present-day mathematics plus a demonstration of ability to do research in one or more branches of mathematics. In addition to the more commonly recognized branches, the Department offers programs of advanced study and research in symbolic logic, in probability and statistics, and in numerical analysis and use of high-speed digital computing machines.

**MECHANICAL ENGINEERING (ENGIN.)**

*Faculty:* N. W. Abrahams, J. M. Alderige, R. N. Allen, W. C. Andrae, T. J. Baird, R. E. Bechhofer, A. H. Burr, S. F. Cleary, B. J. Conta, R. W. Conway, D. Dropkin, G. B. DuBois, F. S. Erdman, H. N. Fairchild, J. W. Gavett, B. Gebhart, R. L. Geer, H. P. Goode, G. F. Hanselman, J. H. K. Kao, E. V. Krick, H. J. Loberg, H. H. Mabie, C. O. Mackey, H. N. McManus, K. E. H. Moltrecht, F. Ocvirk, R. M. Phelan, H. N. Powell, M. W. Sampson, B. W. Saunders, A. Schultz, Jr., D. G. Shepherd, R. H. Siegfried, E. B. Watson, R. L. Wehe, L. Weiss.

**APPROVED MAJOR AND MINOR SUBJECTS**

Administrative Engineering 1, 2, 3, 4

Applied Industrial Statistics 1, 2, 3, 4

Engineering Drawing 1, 2, 3, 4

Operations Research 1, 2, 3, 4

Industrial Engineering 1, 2, 3, 4

Thermal Processes 1, 2, 3, 4

Machine Design 1, 2, 3, 4

Thermal Power 1, 2, 3, 4

Materials Processing 1, 2, 3, 4

Thermal Environment 1, 2, 3, 4

For the professional Masters' degrees, Master of Mechanical Engineering (M.M.E.) and Master of Industrial Engineering (M.I.E.), see the *Announcement of the College of Engineering*.

As prerequisite for graduate study in mechanical engineering, the student should have the equivalent of the courses in his major field that are required of undergraduates in mechanical engineering at Cornell. These courses are described in the *Announcement of the College of Engineering*. Those lacking the full equivalent of this training may be required to take one or more of these undergraduate courses or to do assigned work to make up the deficiency.

There are five departments in the Sibley School of Mechanical Engineering. Graduate work is not confined to these specific departments although major and minor subjects tend to coincide with departmental titles. Appropriate minor subjects may be taken in other divisions of the University.

**MACHINE DESIGN.** Unique instruction is offered in design and related subjects without duplication of work offered by other departments. The thesis and related courses may be concentrated in one of the following three fields or may overlap them: (1) design and development of a machine or component, (2) theoretical analysis of machine or component performance, including stress and vibration, and (3) an experimental investigation of performance. For the latter the department has its own laboratory, well equipped with the tools of experimental stress analysis, and instruments and machines for vibration analysis, bearing lubrication performance, and wear testing. Courses are offered on the subjects of creative design, automatic machinery, advanced design analysis, mechanical design of turbomachinery, advanced kinematics, design problems in vibration and dynamics, fluid power and control, automotive engineering, and experimental methods in machine design. Special interests of the staff include the lubrication and performance of bearings under high speeds and dynamic and misaligning loads, gearing, brake performance, impact stresses in machinery parts, endurance of shafts in machinery assemblies, and residual stresses. Students who major or minor in machine design usually take their other work in engineering mechanics, materials, materials processing, control systems, and servomechanisms, mathematics, thermal engineering, or industrial and engineering administration.

**THERMAL ENGINEERING.** There are excellent opportunities for both analytical and experimental studies at the graduate level in thermal engineering. The approved major and minor subjects are in three areas of special interest to the staff. In thermal processes are included such studies as advanced thermodynamics, heat transfer, thermodynamics and fluid dynamics of compressible fluid flow, and combustion. Thermal power includes advanced studies in principles of turbomachinery, combustion engines, propulsion systems, nuclear power, and solar power. Thermal environment includes advanced studies in refrigeration, air conditioning, heat pumps, and the utilization of solar energy. In the laboratories of the School of Mechanical Engineering, experimental studies may be made of thermal processes and of the performance of engineering equipment by the use of combustion engines, steam turbines, pumps, fans, compressors, steam generating units, heat exchangers, refrigerating equipment, air conditioning apparatus, and engineering instruments. By a choice of his minor subject or subjects, the thermal engineering major may study at an advanced level in basic sciences such as mathematics, physics, and chemistry, or in related engineering fields such as aeronautical engineering, chemical engineering, electrical engineering, engineering mechanics and materials, engineering physics, and metallurgical engineering. Many courses are offered at advanced level in the other four departments of the School of Mechanical Engineering which may be combined to constitute a minor subject. The graduate student will ordinarily find it desirable to enroll in a number of the elective courses offered in the Department of Thermal Engineering, and he will be expected to participate in departmental seminars attended by students, staff, and visitors.

**INDUSTRIAL AND ENGINEERING ADMINISTRATION.** Study and research may take place in such traditional areas as manufacturing control, including production, quality, and cost control; methods engineering; production engineering including equipment selection, tooling problems, lay-out and materials handling decisions; organization; and the human relations aspects involved in the above areas. They will also involve newly developed areas such as decision rules, data processing system design, use of high speed digital computers, linear programming, queuing, game theory, and other statistical and mathematical techniques. Profitable topics for study and personal development include the solution of industrial manufacturing and distribution problems from an economic point of view, the application of techniques emerging from recent developments in mathematics and computational equipment, and the analytical approach developing under the title of Operations Research. Students



interested in the field of applied industrial statistics may pursue a course of study involving such topics as sampling inspection, quality control, the design of engineering laboratory, pilot plant, and plant experiments and applications in the area of manufacturing operations.

**MATERIALS PROCESSING.** A general survey at the advanced level will serve as the foundation for work on individual problems dealing with the principal features and specific details of machine tools, cutting tools, machinability of materials, work and tool holding devices, and gaging and inspecting methods. The laboratory provides modern and unique facilities for measuring performance and efficiency of machines, tools and accessories, testing and inspecting of equipment and parts, and experimental investigations of new methods.

**ENGINEERING DRAWING.** Individual attention is available to students wishing to do research and development work in industrial applications and teaching.

## **METALLURGICAL ENGINEERING (ENGIN.)**

*Faculty:* M. S. Burton, J. L. Gregg, C. W. Mason, T. N. Rhodin, G. F. Smith, C. W. Spencer.

### **APPROVED MAJOR AND MINOR SUBJECTS**

Metallurgical Engineering, General 1, 2, 4

Extractive Metallurgy 1, 3

Physical Metallurgy 1, 3

To qualify for admission to candidacy for the general degrees of Master of Science, Doctor of Philosophy with a major in metallurgical engineering, or the professional degree of Master of Metallurgical Engineering, an applicant should preferably have completed satisfactorily a course substantially equivalent in its technical content to the program leading to the degree of Bachelor of Metallurgical Engineering at Cornell. However, individuals who established superior records as undergraduate majors in chemistry, physics, chemical engineering, engineering physics, engineering science or mechanical engineering are also encouraged to supplement their training with advanced work in metallurgy or metallurgical engineering. Such individuals possess desirable backgrounds for specialization in specific areas of metal science and engineering. They will ordinarily be required to pass without credit certain undergraduate courses, or demonstrate proficiency in the particular subject area.

Graduate study programs in metallurgical engineering at Cornell are designed to fit the needs of individual students, in the light of their previous training, aptitudes and interests. Candidates are expected to pursue a program of study that will give them a deeper understanding of the basic and applied sciences, and that will develop initiative and originality. A candidate for a "general" degree is not required to take any fixed curriculum nor a minimum number of credit hours; he can complete much of his graduate program through individually supervised work with members of the faculty. However, the student will ordinarily find it desirable to take advanced courses offered in the Department and to participate in graduate seminars. He will also be urged to pursue advanced courses in mathematics, chemistry, and physics offered in the College of Arts and Sciences. A candidate for the professional degree, on the other hand, is required to complete a minimum number of credit hours, which may be exclusively curricular, i.e., without research, as described in the *Announcement of the College of Engineering*.

A candidate for the degree of Master of Science chooses one minor field, which must be outside the Field of Metallurgical Engineering. For the degree of Doctor of Philosophy, two minors are required, one of which must be outside the field; the other may be within the Field of Metallurgical Engineering, with specialization in

either physical or extractive metallurgy. Minor subjects outside the Field of Metallurgical Engineering may be chosen from a number of areas, including chemistry, physics, mathematics, mechanics, statistics, chemical engineering, engineering physics, mechanical engineering, business administration, and industrial and labor relations.

The specialized training in metallurgical engineering is offered principally in Olin Hall; an experimental foundry and hot-working laboratory occupy a separate building. The usual facilities may be in any area of metal science and engineering or x-ray diffraction examinations, a variety of melting and heat treating furnaces, equipment for casting, working, and welding of metals, for study of unit operations of extractive metallurgy, and for physical and mechanical testing. Other more specialized apparatus, such as for electron microscopy and for vacuum melting are available.

Candidates for general degrees (M.S. or Ph.D.) are expected to present a thesis based on experimental research work in partial fulfillment of the requirements for the degree. Such research may be in any area of metal science and engineering or related non-metallic materials. Investigations are selected to suit the interests and needs of the students, and hence the specific projects actively in progress are constantly changing. Current investigations in the department include the following: reactions at liquid-solid interfaces; semi-conducting intermetallic compounds; effects of alloying, temperature, and strain rate on flow and fracture of iron; 885° F embrittlement of chromium stainless steels; bonding of metals with metal oxides; kinetics and morphology of crystal "round-off" in liquid environment; recovery and recrystallization of binary iron alloys; mechanism of precipitation hardening in stainless steels; eutectoid and peritectoid transformations in the nickel-manganese system.

In addition to the usual teaching assistantships, a number of research assistantships on either a nine-month or twelve-month basis are available in metallurgical engineering.

## PHYSICS (ARTS)

*Faculty:* L. L. Barnes, H. A. Bethe, H. G. Booker (Electrical Engineering), R. H. Brout, J. M. Cassels, D. D. Clark (Engineering Physics), G. Cocconi, D. R. Corson (Engineering Physics), R. M. Cotts, T. R. Cuykendall (Engineering Physics), J. W. DeWire, G. Dresselhaus, C. W. Gartlein, T. Gold (Astronomy), K. I. Greisen, P. L. Hartman, D. F. Holcomb, T. Kinoshita, J. A. Krumhansl, J. R. Lamarsh (Engineering Physics), D. M. Lee, R. M. Littauer, B. D. McDaniel, P. Morrison, H. F. Newhall, J. Orear, L. G. Parratt, T. H. Rhodin (Engineering Physics), H. S. Sack (Engineering Physics), E. E. Salpeter, B. Siegel (Engineering Physics), R. H. Silsbee, A. Silverman, R. L. Sproull, P. C. Stein, D. H. Tomboulion, R. R. Wilson, W. W. Woodward.

## APPROVED MAJOR AND MINOR SUBJECTS

Physics 1, 2, 3, 4

Theoretical Physics 1, 2, 3, 4

Experimental Physics 1, 2, 3, 4

Biophysics 3, 4

*Language requirement for the Master's degree: proficiency in French, German, or an approved substitute before completion of the second residence unit, or before the beginning of the third calendar-term of residence.*

The major and both minor subjects for the doctorate should not be chosen inside the Field of Physics.

The major subject for the doctorate may be called experimental physics only if accompanied by theoretical physics as a minor, and theoretical physics only if accompanied by experimental physics as a minor.

The major subject for the Master's degree must be in physics; the minor subject may or may not be in the field of physics.

In Physics no exceptions will be recommended to the rule that graduate assistants, whether in teaching or in research, receive only fractional residence credit.

Members of the staff are especially interested in directing graduate research in the following fields:

EXPERIMENTAL PHYSICS. Nuclear and particle physics; cosmic rays; atomic and X-ray spectra; physical electronics; and physics of solids.

THEORETICAL PHYSICS. Quantum mechanics; quantum theory of fields; theory of nuclei; fundamental particles; cosmic radiation; and the theory of the solid state.

A colloquium in general physics, a seminar in theoretical physics and a seminar in solid state physics meet regularly, and seminars in special fields as arranged.

A booklet entitled *Graduate Work in Physics at Cornell* can be obtained by writing to the Chairman, Department of Physics, Rockefeller Hall. The booklet contains additional information about graduate work and research in physics for the entering graduate student.

## STATISTICS (*AG., ARTS, ENGIN., I.L.R.*)

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